NOTES ON Agriculture

IN

South Australia

NOTES ON AGRICULTURE IN SOUTH AUSTRALIA.

PREPARED BY W. L. SUMMERS.

ISSUED BY THE DEPARTMENT OF AGRICULTURE AND INTELLIGENCE.

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DEPARTMENT OF AGRICULTURE AND INTELLIGENCE.

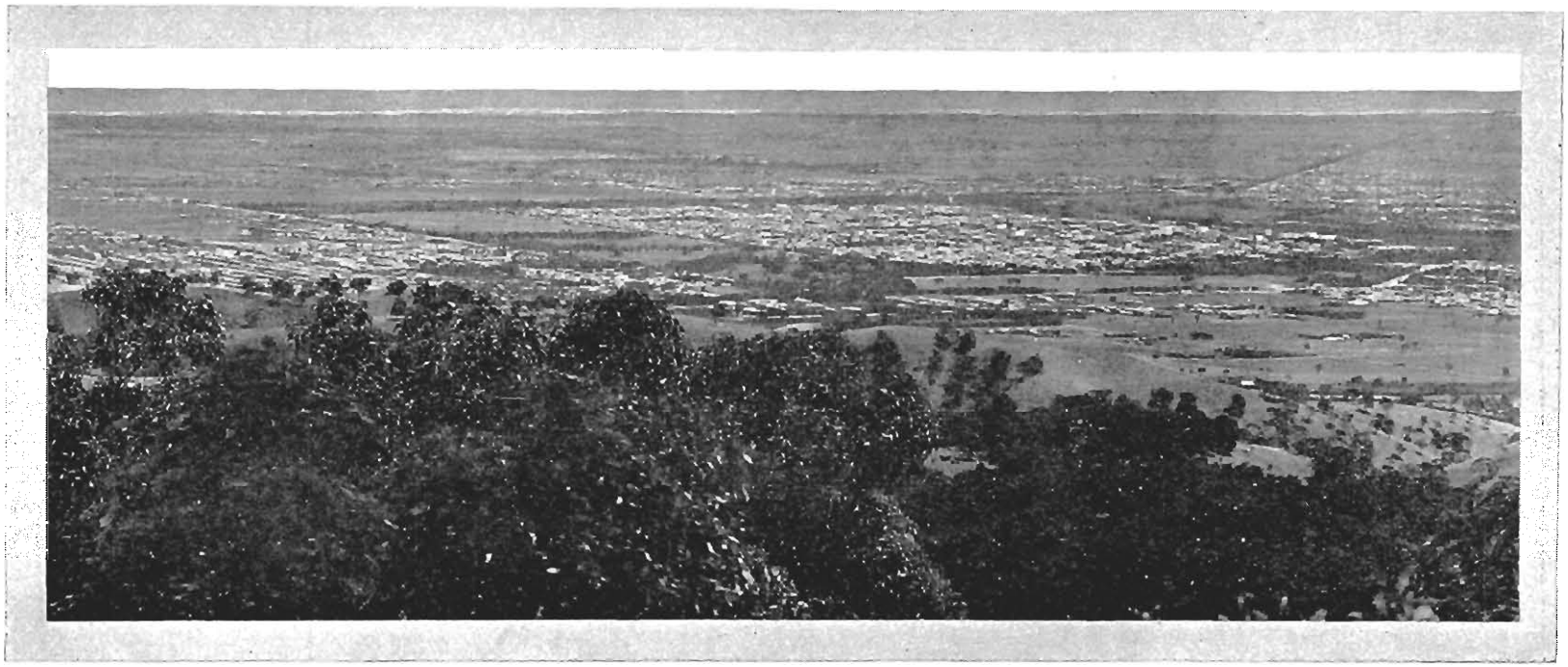
Adelaide, South Australia,

April 24th, 1908.

This brochure has been prepared in response to numerous requests for information in respect to South Australian Agriculture received from different parts of the world, and also for distribution at the Franco-British Exhibition. The space at command does not permit of each section of the agricultural industry being dealt with in detail; but those desiring further particulars concerning any branch of agriculture can obtain the same on application to the Department. The compilation of this brochure has been undertaken by Mr. W. L. Summers, of this Department.

WILLIAM ANGUS, *Director.*

BIRDSEYE VIEW OF PORTION OF ADELAIDE AND SUBURBS FROM MOUNT LOFTY.



Ernest Gall, Photo.]

Adelaide, the capital of South Australia, is situated on the plains between the Mount Lofty Ranges and the shores of St. Vincent's Gulf. It is surrounded by a public reserve about one-third of a mile in width, and is divided into two distinct portions by the River Torrens and public reserves abutting on either bank. The population of the city and suburbs amounts to 178,000.

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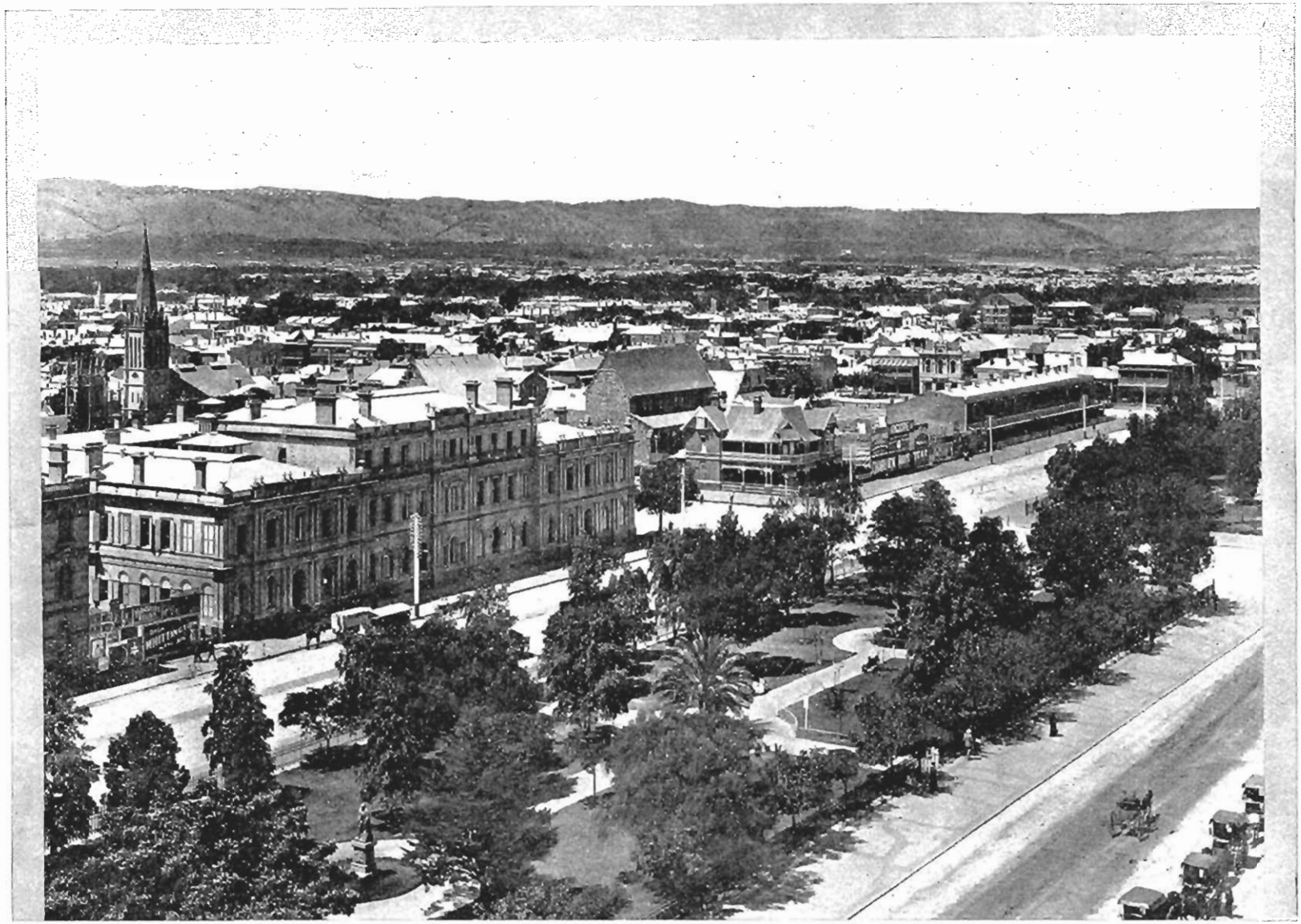
The purpose of this pamphlet is to present to those interested a general view of the conditions and prospects of South Australian agriculture. No attempt is made to write anything in the way of a detailed account of the progress of the different branches of agriculture in the State, but the facts and figures herein will convey in a general manner some information of interest to inquirers.

There is no question that the prosperity of South Australia is mainly dependent upon its agricultural resources, and, fortunately for the State, these resources are practically unlimited in extent. It is doubtful whether any country produces a greater value of agricultural products per head of population, and our exports also reach a very high average. The absence of coal mines and the relatively small number of other large mines undoubtedly has caused greater attention to be paid to agriculture in this State than was the case in the early history of our neighbors. Taken as a whole, the prosperity of the South Australian agriculturist is unexcelled, and the farmer desirous of investing some capital will find few countries where he can secure better interest on his money.

SOME INTERESTING FIGURES.

Area of South Australia	380,070 sq. miles
Population of South Australia	392,500
Area under cultivation	3,246,835 acres
Stock numbered in 1906—	
Sheep	6,625,000
Horses	206,600
Cattle	325,700
Pigs	111,240
Poultry	1,635,000
Total value of Agricultural Products in 1907 (approximately)	£9,000,000
Equal to £23 per head of population.	
Total value of Agricultural Exports oversea in 1907	£5,300,000
Value of Imports, 1907	£12,120,052
Value of Exports, 1907	£13,769,399
Total value of Imports and Exports equal to £66 per head of population.	
Savings Bank—	
Deposits in	£5,320,872
Number of depositors	161,855

ADELAIDE LOOKING SOUTH-EAST FROM GENERAL POST OFFICE.



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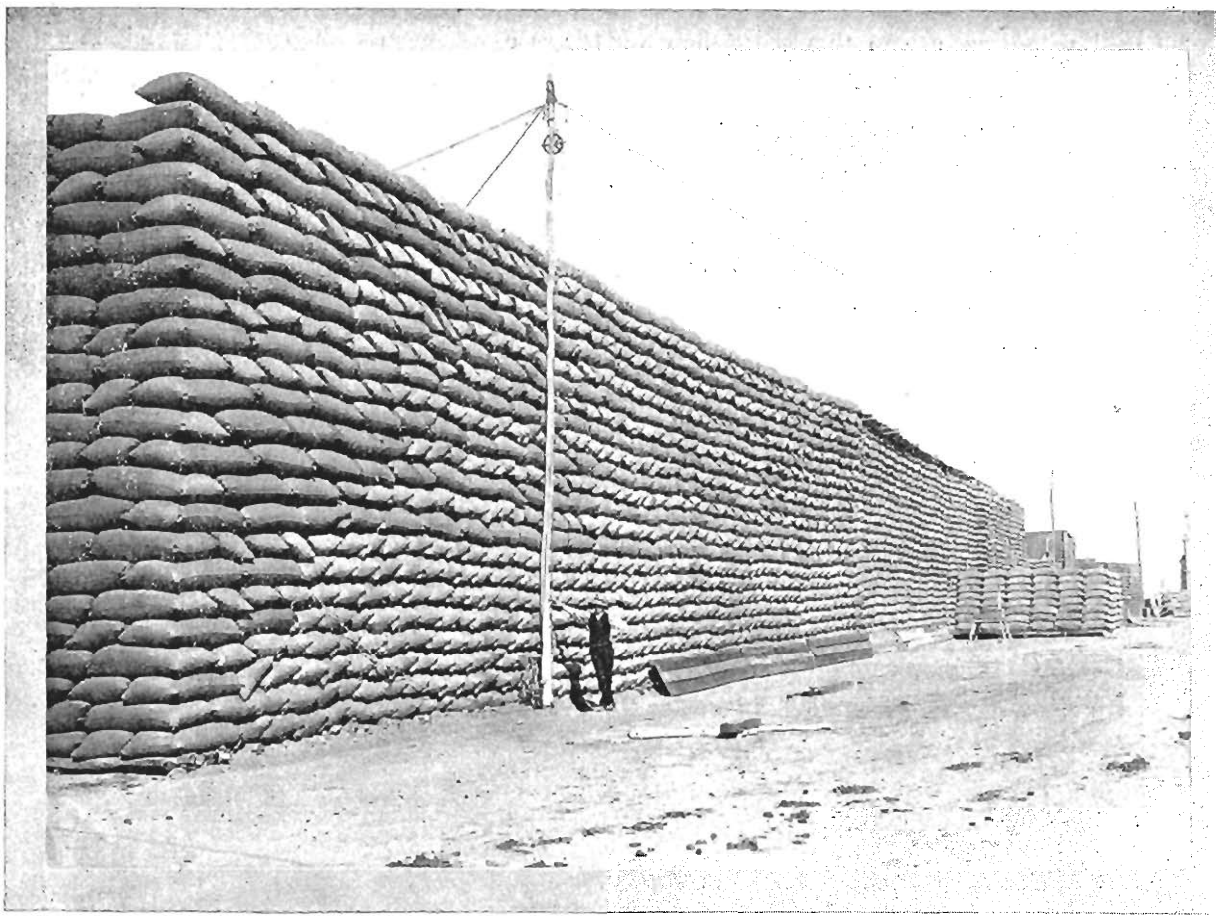
SOME AGRICULTURAL EXPORTS.

The following figures give the values of our principal agricultural exports to oversea countries for 1907 (exports to the neighboring States of the Commonwealth, which are of considerable magnitude in respect to flour, hay, poultry, dairy products, fruit, vegetables, and wine, not being included):—

	Value.		Value.
Wheat	£2,152,842	Butter	£79,855
Flour	403,920	Tallow	45,657
Wool	1,850,094	Wine and brandy	32,698
Skins and hides	430,041	Fruits—Fresh and preserved	22,054
Frozen meat	170,028		

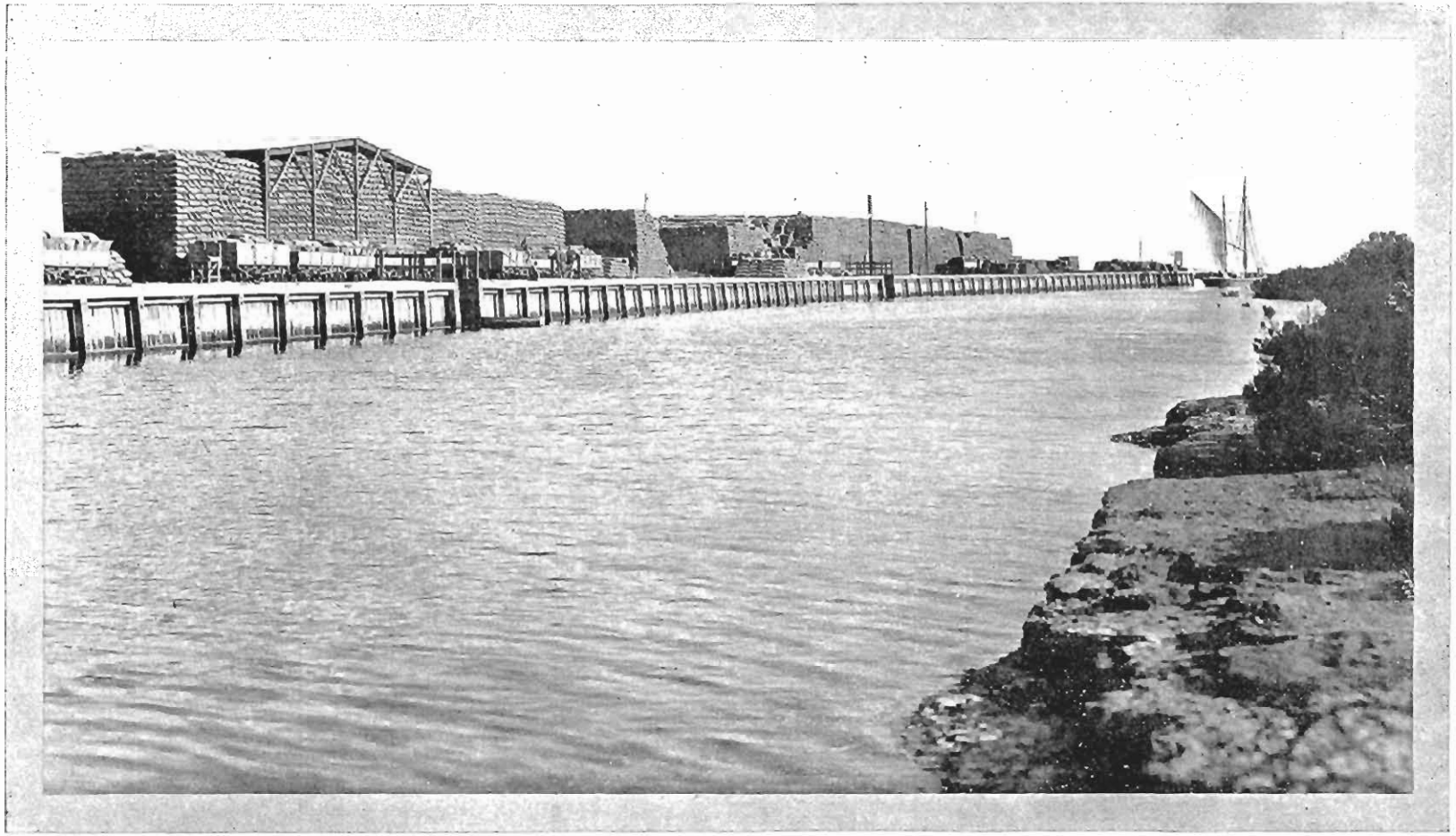
It may be mentioned that last year, owing to the small apple crop and to the active inter-State demand for dried fruits, the oversea exports in these lines were very much less than in previous years. In 1906 the fruit exports to all countries were valued at £140,000.

STACK CONTAINING OVER 500,000 BUSHELS OF WHEAT AT WALLAROO.



Govt. Photo]

STACK OF 680,000 BUSHELS OF WHEAT, VALUED AT £135,000. ON PORT WAKEFIELD WHARF.



Govt. Photo.]

Shipments of wheat are made from various ports in proximity to the wheat areas, thus lessening transit charges to a material extent. The following table shows the quantities of wheat exported last year from the respective ports:—

	Bushels.		Bushels.		Bushels.
Port Adelaide	4,237,631	Port Germein	715,360	Tumby Bay	109,548
Port Wallaroo	2,696,133	Port Victoria	525,976	Franklin Harbor	93,613
Port Pirie	2,612,716	Port Wakefield	353,316	Streaky Bay	71,556
Port Augusta	930,787	Port Broughton	232,313	Point Turton	56,847

LAND SETTLEMENT.

The Crown lands of South Australia are available for settlement under conditions varying according to the class of the land and its situation. Areas suitable for cultivation may be selected in blocks up to £5,000 in value, the area of the block depending upon the quality, situation, &c., of the land; with properties suitable for grazing purposes only, sufficient land to carry 5,000 sheep, or in dry areas, 10,000 sheep, may be procured. These lands may be held either on perpetual lease or on agreement with covenant to purchase. If taken on perpetual lease the annual rental will be from ¼d. to about 6d. per acre, according to the value of the land, proximity to railway lines, &c. When held under agreement to purchase the payments, made half-yearly, go towards the purchase-money, and on 60 such payments being made the purchase is complete. Land under the Pinnaroo Railway Act, which must be held under covenant to purchase system, can be bought outright at any time, while the purchase of all other, except repurchased land, may be completed after holding it for six years. During 1907 the Government allotted 1,615,959 acres in 1,055 separate leases and agreements, while it is anticipated that nearly a million acres will be available for allotment during 1908.

From time to time the Government repurchases large tracts from private landowners, afterwards subdividing the land and throwing it open for the purposes of closer settlement. This land can only be taken on agreement to purchase, and may be held in blocks up to £2,000 worth unimproved value; with improved blocks and grazing land the value allotted to any one individual may extend to £4,000. The purchase-money, together with interest at the rate of 4 per cent., may be paid in 70 half-yearly instalments (the first ten payments being for interest only, which is equal to 4 per cent. on the purchase-money), or purchase may be completed by paying balance of purchase-money at any time after the expiration of nine years. Full particulars can be obtained from time to time on application to the Surveyor-General, Adelaide, South Australia, of lands open for selection, price per acre, terms of purchase, &c.

In addition to Government lands there are always a large number of improved farms suitable for cereal-growing, dairying, sheep-breeding, fruit-growing, &c., for sale by private individuals. In such cases the conditions of sale are matters of private treaty between buyer and seller, but the purchaser can always secure land on easy terms as to payment.

The State Bank, established to assist holders of land having insufficient capital to purchase outright, lends up to 60 per cent. of the value of freehold land and improvements, and in case of a Crown lease, up to one-half of the selling value of such leases, including improvements. The interest charged is at the rate of 4½ per cent. per annum, and the principal is repayable in regular half-yearly instalments, extending over a period of from one to 42 years, according to the terms agreed upon. A borrower, obtaining, say, £400 on a 20 years' loan, would liquidate this liability, including interest, in 40 half-yearly payments of £15 5s. 4d.

In addition, the public Savings Bank and various financial institutions lend money on land at ruling rates of interest.

CLIMATIC CONDITIONS.

A few words in reference to our climatic conditions will enable the reader to more readily appreciate the notes on the various sections of agriculture. South Australia, over the greater portion of its area, is essentially a country of comparatively limited rainfall. Speaking in a general sense, there are only two seasons, *i.e.*, winter and summer; the distinct periods of spring and autumn of the colder countries being of very short duration, and from a practical point of view it is difficult to say where winter ends and spring commences. During the winter approximately three-fourths of the total rainfall is recorded; the weather at this time of the year being generally mild. Extreme cold and frosts are experienced in but few localities, whilst snow is practically a rarity—light falls occurring only on the higher lands and at long intervals. The summer is warm and dry, and periods of several months without rain are frequent; these, as will be shown later, afford ideal conditions for the harvesting of the wheat crop. Our climatic conditions generally are unusually favorable to outdoor pursuits, and, with the exception of the two midwinter months and a few hot spells during the hot weather, work can be carried on under most favorable conditions. Taking the year right through, it is but rarely that stock require to be kept under cover for two or three days in succession, or that the farmer cannot get about his work.

Our cereal crops are sown at the commencement of winter (April to May, according to district), and make most of their growth before the summer sets in. The warm weather of early summer (October-November) brings the crop to maturity, usually resulting in the production of a bright heavy grain, highly appreciated in the world's markets on account of its dryness and the color and quality of its flour. The nature of the summer, except in the cooler districts, militates against the cultivation of summer crops on an extensive scale except with the aid of irrigation, and consequently the skill and energy of the farmer have been mainly directed to the growing of cereal crops and the breeding of stock.

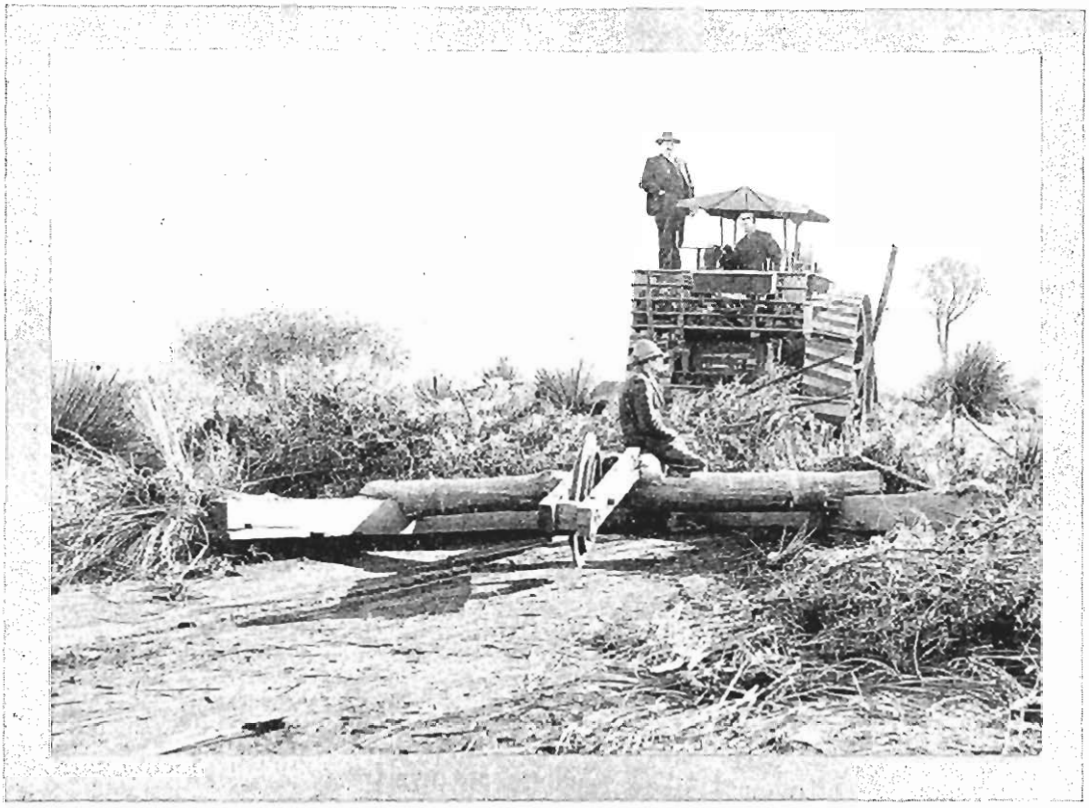
The following rainfall record for 1907 of one of our typical wheat-growing districts will convey to the reader an idea of the distribution of rain in its relation to the cereal crop:—

	Inches.	
January	·00	
February	0·03	
March	0·29	
April	3·07	
May	1·06	Total rainfall during period of growth of crop = 12·08in.
June	1·36	
July	2·88	
August	2·79	
September	0·70	
October	1·33	
November	1·96	
December	0·67	
Total	16·14 inches	

This record is typical of the distribution of the rain in the greater part of the State—the actual totals varying according to locality. Under conditions such as these crops of 30bush. to 40bush. per acre have been reaped by many farmers during the past few years from land worked on scientific lines. Last season one farmer harvested over 50bush. per acre on 100 acres, and from a total area of 950 acres obtained over 34,000bush. of grain, worth £6,800.

A newcomer from the old country landing in South Australia, say, in January, after a period of dry summer weather, would probably find the parched appearance of the fields uninviting, and would form a poor idea of the capabilities of the country were he not acquainted with our records. As far back as 1838 Captain Sturt publicly warned the settlers that to attempt to cultivate the land on the Adelaide plains would result in disaster. This same land now is probably worth for cultivation purposes an average of £15 per acre, while a very large proportion of it realises £40 and more per acre for the growing of green crops, fruits, and vegetables.

CLEARING LIGHT SCRUB PRIOR TO CULTIVATION.



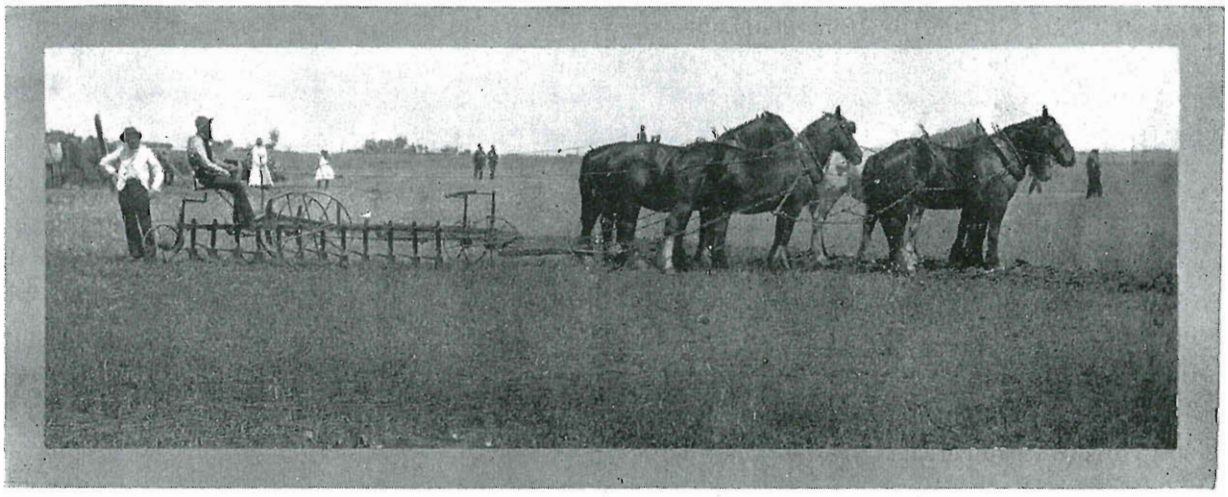
Dabovich, Photo.]

The heavy timber frame shown above is shod with steel plate. This cuts or drags up all before it. When the brush is dry it is burnt, and the land is then ready for ploughing. Horses or bullocks are also used for this work. These implements are made to clear from 12ft. to 30ft., according to the power employed.

WHEAT-GROWING.

In dealing with the area under cultivation, wheat-growing takes first place. This is doubtless due to two facts—firstly, the greater portion of our country is better adapted to the production of wheat than of other cereals; and, secondly. owing to its special qualities there is always a ready demand in the markets of the world for our wheat, so that the farmer has no difficulty in disposing of his produce, no matter how great the crop may be. Of the total of over 3,000,000 acres under cultivation, more than one-half is represented by our wheatfields. In the third year after the establishment of the State an area of about 120 acres was under wheat; but thence onwards there has been a fairly rapid development, and in 1866 there were about half a million acres under wheat. These figures were doubled within the next decade, and at no time during the last 25 years has the area under wheat been less than 1,500,000 acres. The 1907 crop is estimated at 20,720,000bush., equal to 11·20bush. per acre on 1,850,000 acres. The total production of wheat during the past 25 years exceeds 186,000,000bush.

PLOUGHING WITH MULTI-FURROW PLOUGH.



W. S. Smith, Photo.]
The above shows a 12-furrow Plough working in light land. Six horses are drawing this plough, which, however, is only turning over the ground a few inches in depth.

Of late years there has been a slight falling off in the quantity of land under wheat. This may be attributed to two causes—firstly, to the fact that 25 years ago a large area of northern country was broken up by the wheatgrower, but experience having shown that much of this land was better adapted to grazing, a large proportion of it is now mainly utilised for dairying and for sheep; secondly, to the recognition by the farmer that it is more profitable to put in smaller areas of well-tilled land than a larger acreage insufficiently prepared. This latter factor is well illustrated by the increase in the area of land fallowed prior to being sown to cereals. In 1896 the area of fallowed land was 534,000 acres, equal to 24·3 per cent. of the total cereal area, while in 1906 the percentage of fallow had reached 51·7 per cent.

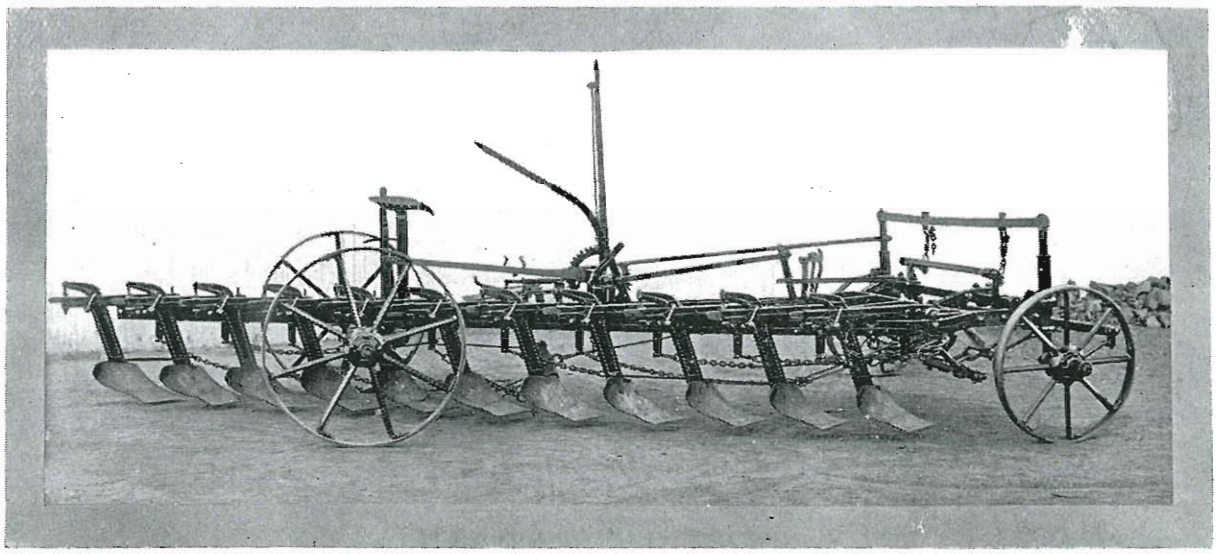
The comparatively low average yield of wheat per acre is sometimes quoted against South Australia, but when dealing with such figures consideration must be given to the circumstances affecting them. As shown above, just over half the total area under cereals is first fallowed; the rest consists of stubble land cropped the previous year, old lea land, and newly cleared land, most of which, under the nature of things, is only roughly prepared for the seed, and the returns from this land are naturally low. Against the low return from land prepared in this way the cost of cultivation is reduced to a minimum, a few bushels per acre covering the outlay. The average yield of wheat in South Australia during the past three years has exceeded 10bush. per acre, and it is safe to say that during that period the average return from fallow land has been 15bush. or more per acre, which returns a good profit on cost of cultivation.

As previously indicated, the precipitation over the bulk of the wheat-growing areas of South Australia is relatively light, and it is doubtful whether in any part of the world wheat of such high quality is grown on so small a rainfall. In ordinary seasons only a very small proportion of the wheat, when properly cleaned, will fall below 63lbs. to the measured bushel, and weights of 65lbs. and 66lbs., without any special preparation, are quite common, while at the agricultural shows the prize wheats usually weigh from 68lbs. to 70lbs. to the bushel. Wheat is grown in many districts where the rainfall, from the time the seed is sown until the harvest is gathered, does not exceed 10in. to 12in. In spite, however, of the low precipitation, farming is conducted profitably by the adoption of methods for the conservation and utilisation of the limited rainfall, and the breeding of wheats adapted to our special conditions.

It may be noted that the aim of the farmer in these comparatively dry areas is, as far as possible, to utilise the rainfall of two winters for one season's crop. This is secured by the adoption of a three years' rotation, viz., grazing, bare fallow, cereals. After the cereal crop is harvested stock graze on the stubble and the pastures during the ensuing 18 months. The land is then ploughed up early in the winter to permit of the rains penetrating deeply and to avoid loss of moisture by run off. This having been done, the surface of the land is kept loose and fine through the spring and summer following, experience having proved that a dry earth mulch is a great factor in retarding the evaporation of soil moisture. The following winter the land so treated is sown to cereals.

The great majority of our wheats are of local origin. In the early days, when wheat-growing was confined to the cooler and moister districts, the varieties introduced from Europe gave satisfactory results, but as cultivation extended into the drier areas these wheats were found to be less suitable, owing to the fact that when coming into ear they ran the risk of injury from the hot dry winds from the northern plains which are sometimes experienced in the early spring. As previously pointed out, the wheat plant must, in these areas, make most of its growth during the winter months, but the varieties from colder countries remained on the ground, rooting and tillering, until the warm weather caused them to run up to head. Occasional severe losses from the effect of hot winds led a number of intelligent farmers to consider the question of obtaining earlier maturing wheats; and, as it was observed that at times a single plant of wheat would mature earlier than the bulk of the crop, the heads from this plant were carefully gathered and the seed sown in small plots. Each year from the plots the best and earliest ripening plants were again selected, until sufficient seed was obtained to sow larger areas. In this way quite a number of natural sports or crosses have been fixed.

ELEVEN-FURROW STUMP-JUMP PLOUGH COVERING ABOUT 8FT. IN WIDTH.



Ziegler, Photo.]

Another trouble which caused heavy losses, not only in South Australia, but throughout the whole of the continent, was red rust. This fungus, known to science as *Puccinia graminis*, has during seasons favorable to its development caused the loss of millions of pounds, and although in most years the damage done was not great, still it was realised that unless the disease was controlled it would seriously hamper the extension of the wheat-growing industry. Special Commissions were appointed by Parliament to investigate the matter; conferences of experts were held; and a reward of £10,000 was at one time offered for a cure or preventive of red rust. Various methods were suggested from time to time, but, with few exceptions, these were found impracticable on a large scale; and it was left to a South Australian farmer, Mr. Thomas Ward, of Nelshaby, to show that the solution of the problem lay within the reach of the farmers themselves. This gentleman farmed land in a district which was very subject to the disease, and one rusty year on examining the crop, which was badly affected, he noticed a plant differing in appearance from the rest of the crop and bearing well-filled heads containing plump grain, the wheat from the rest of the crop being shrivelled. Reasoning that there must be some special cause for this plant being free from rust, he saved this head, propagated the seed for several years, during which time it proved itself to possess practical immunity from injury by rust. This wheat, which was named "Ward's Prolific," was eagerly sought after by farmers and quickly became popular. It possessed, however, several objectionable characteristics; but the success achieved in the process of selection led other farmers to follow up the work thus started with a view of eliminating the weak points while retaining the powers of rust resistance. In this direction most satisfactory results were obtained, and to-day, not only in South Australia, but in the other States of the Commonwealth, a great proportion of the wheat grown consists of varieties thus obtained.

During later years this work of improvement of wheat has received more attention at the hands of those in charge of Agricultural Experimental Stations, especially in the direction of increasing the flour strength of the wheat; and here also considerable success has been achieved.

STRIPPING AND WINNOWING WHEAT.

W. S. Smith, Photo.]

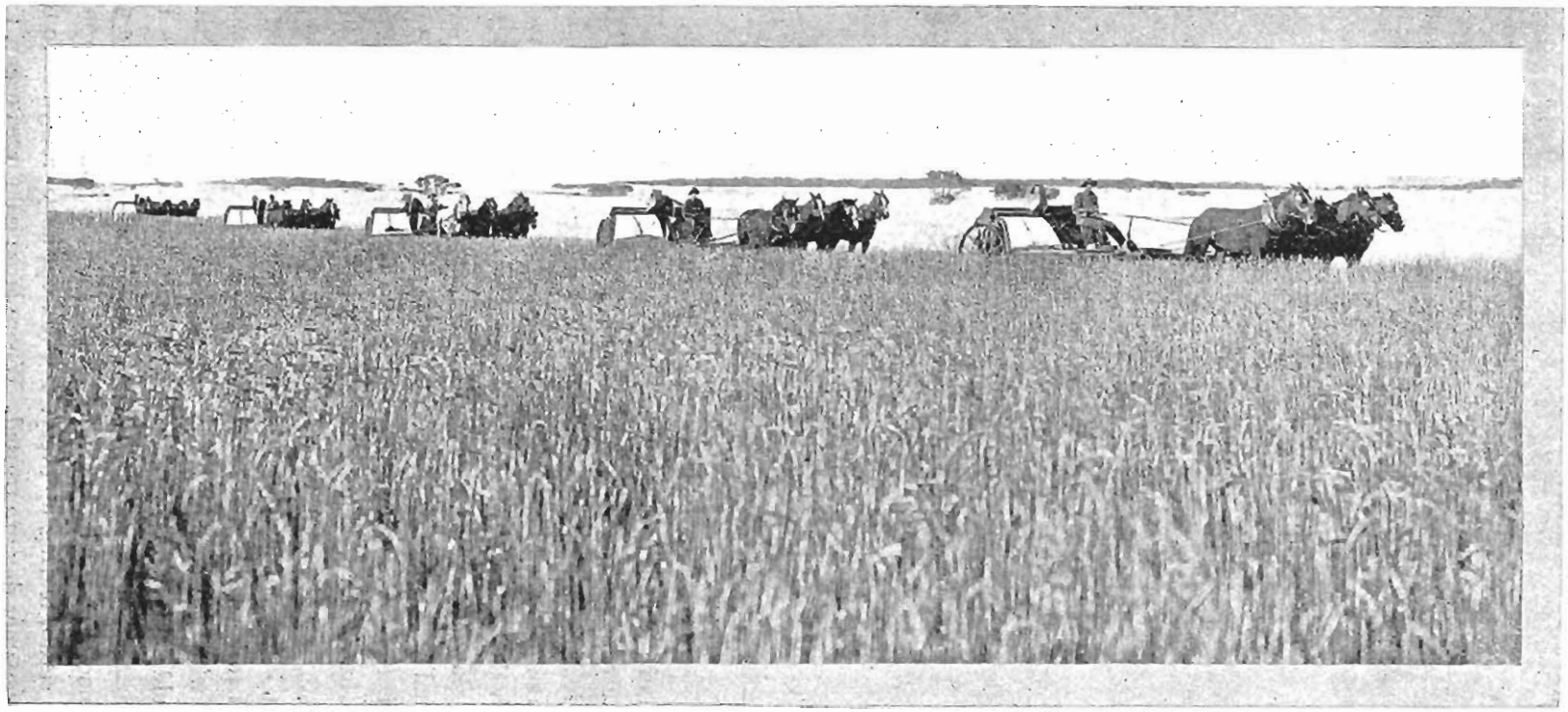
In other directions the new conditions which the farmers have had to meet in this country have resulted in the adoption of new methods of cultivation and also in the invention of new classes of agricultural machinery. The first item to which attention may be drawn is the Australian harvester. The early settlers had to reap their grain with the sickle and thresh it by the old-fashioned methods in vogue in the older countries where labor was more plentiful. In the newly-founded colony not only was labor more expensive (harvesting charges often exceeding £2 per acre), but even at these prices it was difficult to obtain the necessary labor to do the work by hand. This naturally directed attention to the possibility of harvesting the wheat by machinery, and in 1843 a reward was offered for the invention of machinery capable of this work. None of the competitors for this reward were successful; but, at the same time, Mr. John Ridley was at work on a machine which proved exceedingly satisfactory, and from which all our present day harvesting machinery have been evolved.

As the wheat ripens during a period of warm dry weather, the crop, instead of being cut with the binder and threshed, is harvested by means of the stripper or stripper-harvester, which, by means of a comb to catch the ears and revolving beaters, takes off the grain, leaving the stubble standing. After harvesting with the stripper the wheat must be winnowed to separate the chaff, foreign seeds, straw, &c., from the grain; but with the stripper-harvester the whole of the work is performed at one operation. An up-to-date stripper will harvest 15 acres to 20 acres per day under fair conditions, the cost being about 2s. to 2s. 6d. per acre. The ordinary stripper-harvester will, under similar conditions, harvest a less area than the stripper, but the "push harvester," as it is called, propelled by eight horses, will take a 12ft. swathe and harvest 25 to 30 acres in an average working day.

A MOTOR-POWER WINNOWER—3½-BRAKE HORSE-POWER ENGINE.

Gordon Bails, Photo.] **This winnower will clean over 1,000 bushels of wheat per day.**

A considerable area of the land at present under cultivation in South Australia was formerly covered with comparatively low trees (mallee) of the eucalyptus or "gum tree" family, of small girth, but possessing a greatly enlarged underground stem. Much of this land, also, is of travertine limestone formation, and, when broken up, numerous large stones are scattered on the surface of the land. In the early days the trees were grubbed out prior to the land being cultivated, but this was found to be too slow and costly with the "mallee scrub," as it was called. Cutting the trees level with the ground was tried for a time, but a later development was to roll the mallee with a heavy roller (ofttimes consisting of a worn-out steam boiler), propelled in front by a team of bullocks or horses. The timber was left on the ground until quite dry, and in the autumn a firestick was put into it. A "good burn" resulted in the whole of the fallen timber, except some of the largest trees, being burnt, while a partial burn entailed the gathering of the unconsumed timber into heaps to be again fired. The whole operation is very cheaply carried out, while the ashes, mixed with the surface soil, made a good seed bed and fertilised the land. Ordinary mallee land could be rolled down in this way at the rate of eight acres to 12 acres per day, but of late years a more rapid method has been adopted where large areas are dealt with. Two traction engines running parallel to each other drag a heavy chain, a couple of chains or more in length, over the scrub, tearing up everything (except large trees) before them. By this means 120 acres to 150 acres per day are treated. Where large gum trees occur, these are pulled over by the engines instead of being cut down by hand.



Govt. Photo.]

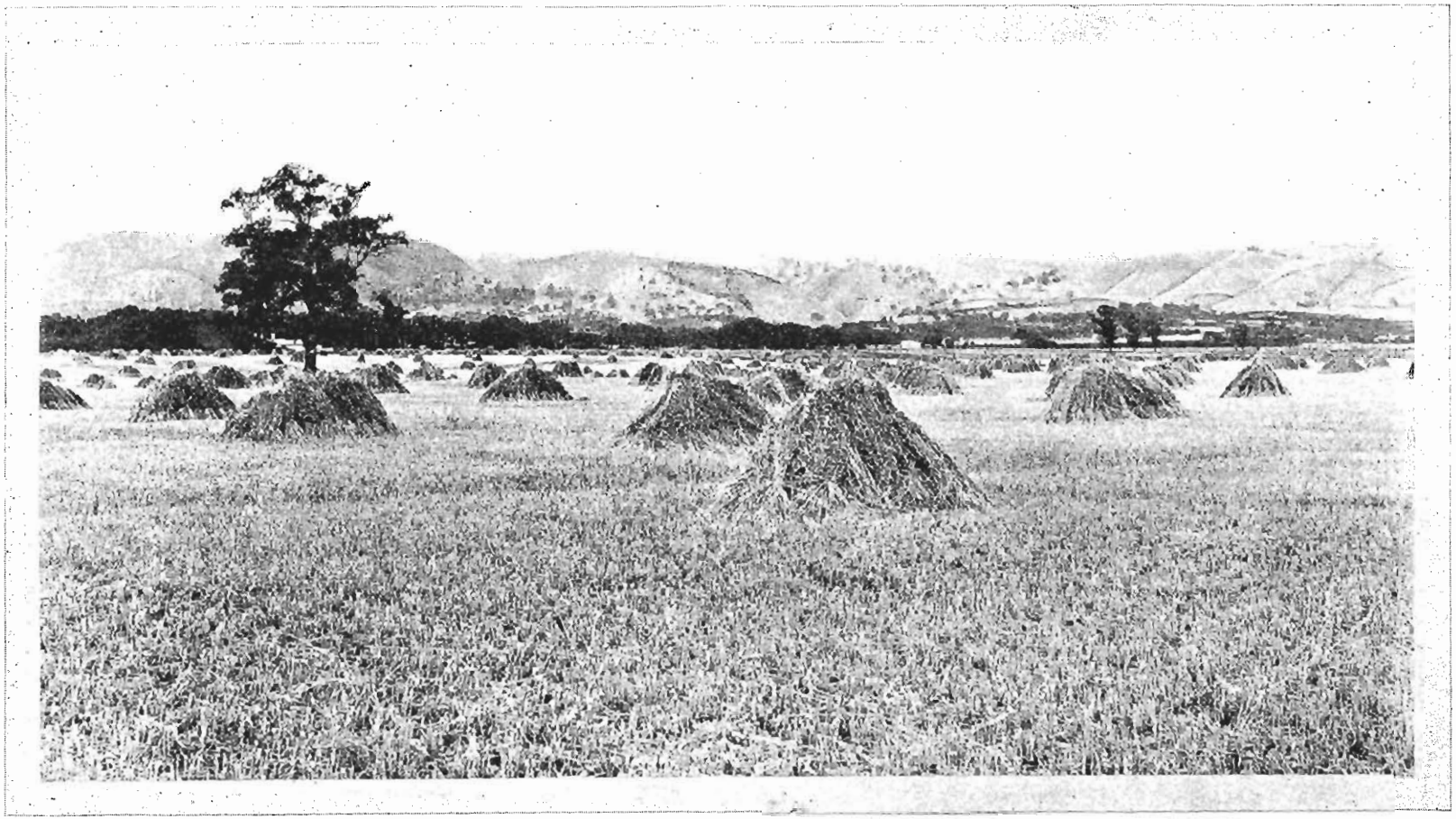
The above shows five complete harvesters at work in a large field of wheat. The crop is left until the grain is quite ripe, and these machines strip, thresh, winnow, and bag the grain at one operation. From 12 acres to 16 acres per day is harvested by each machine.

This " scrub country," after being treated in the manner described, produced good crops of grain for several years where the seed was simply harrowed in among the stumps with rough home-made harrows. The stones and stumps, being at ground level, presented little difficulty in the way of harvesting the crops with the stripper, but when it became necessary to properly cultivate this land the farmer was faced with the fact that the ordinary fixed ploughs were absolutely unsuitable for the purpose. This led a number of agricultural blacksmiths to devote their attention to the possibility of making a plough that would ride over any obstructions of this character, with the result that to-day not only many of our ploughs, but also other agricultural implements are constructed on what is known as the stump-jumping principle. These ploughs are constructed in such a manner that the body carrying the share, instead of being a fixture on the beam, works on a pivot which, when subject to more than a certain pressure, allows the share and body to rise and ride over any obstruction, the weight and the pressure of the draught causing the share to enter the ground again when the obstruction is passed. Most of this ground being comparatively light and easy to work, except in respect to these stumps, &c., the adoption of the stump-jump plough quickly led to an increase in the size of the ploughs, and from two or three furrows they have been gradually enlarged until to-day hundreds of multi-furrow ploughs (as they are called) of from eight to 12, or even more furrows, are used in this State, materially reducing the cost of cultivation, the ploughs turning over from 6ft. to 8ft. at a time.

THRESHING WHEAT AND BALING STRAW AT ROSEWORTHY AGRICULTURAL COLLEGE.

R. K. Lawrence, Photo.]

A HAYFIELD NEAR THE CITY, SHOWING THE HILLS IN THE BACKGROUND.



Govt. Photo.]

The annual hay crop varies from 300,000 tons to 500,000 tons, of an average annual value of between £500,000 and £600,000. A considerable export trade is done with several of the neighboring States.

OTHER CEREAL CROPS.

Dealing with other cereal products it may be mentioned that, partly owing to the fact that the conditions in South Australia are more suited to the growing of wheat than of oats and barley, and also to the absence of an export market for large quantities of these grains at prices that would pay the producer, the area devoted to these cereals is comparatively limited, reaching approximately 28,000 acres for barley and 57,000 acres for oats, with a total value of produce of about £200,000. The greater part of this is grown in the southern and cooler districts. The South-East is particularly adapted to the growth of both barley and oats, and heavy crops are obtained in this locality, 40bush. to 50bush. of barley being frequently obtained. The barley from this district and from Kangaroo Island is in high repute for malting purposes. Oats are grown both for stock-feeding and for the preparation of oatmeal, several mills dealing with the latter product. Harvesting operations in this locality are carried out more on English lines owing to the cooler and moister conditions. The crop is cut with the string-binder when the grain is in the dough stage, allowed to mature in the stooks, and threshed with a steam-thresher. Of hay about 300,000 acres are grown, the crop reaching a value of about £600,000. Wheaten hay constitutes the bulk of this crop.

Our export of cereals is practically confined to wheat and wheat products, but this reaches very large dimensions. In 1907 wheat to the value of £2,152,842 and flour worth £403,920 were exported, while the total value of the exports of breadstuffs for the past 25 years reaches the enormous sum of £33,000,000.

A GOOD CROP OF HAY—ABOUT 3 TONS PER ACRE.

Govt. Photo.

A TYPICAL HARVEST SCENE ON A SOUTH-EASTERN FARM.

Ernest Gall, Photo.]

The climatic conditions of the south-eastern portion of the State are much wetter and cooler than the main cereal-growing centres. Here barley and oats take the place of wheat to a large extent; the crops also ripen much later, and the stripper is replaced by the binder and the steam-thresher in the harvesting operations.

MANURING THE CEREAL CROP.

The experience of the South Australian farmers has been similar to that of other pioneers in one respect, viz., that these virgin lands when brought into cultivation yielded profitable crops without the aids of commercial fertilisers, but it is doubtful whether in any country land has been cropped for so many years as were large areas in South Australia without the expenditure of a penny for fertilisers. As was natural, however, the crop returns from these lands became less and less as years passed by until, in many instances, farmers left their holdings in older districts and started afresh in the newly-opened lands further afield. Such a practice could only, of course, continue for a short period, as the available land within easy reach of the then opened railways was naturally limited.

The necessity for improving the crop returns caused attention to be devoted to improved methods of cultivation and the application of fertilisers. Many of the farmers were familiar with the fertilisers used in Europe, and in most of the early work with them in this State nitrogen was the dominant ingredient, while the dressings were on similar lines to those in the old country, viz., 2cwts. or more per acre. It was soon found that not only was the cost of these applications too great, but the increase in the yields was not commensurate with the outlay. Further experimental work, however, proved that fertilisers containing water-soluble phosphoric acid had a marked effect on the cereal crop, and, as the increased returns thus obtained paid for the outlay several times over, the practice soon became general, and of the 1907 cereal crop it is estimated that nearly 1,400,000 acres, equal to 60 per cent. of the total area, were manured.

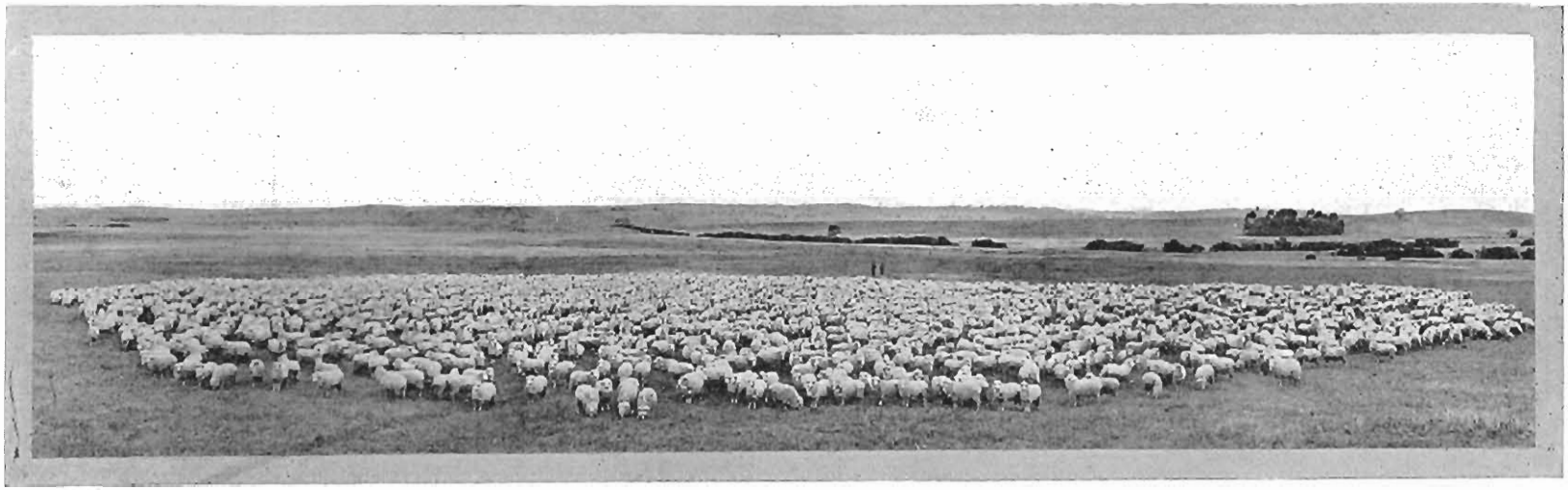
The results of numerous analyses have shown that, generally speaking, the soils of South Australia are unusually rich in potash—which is borne out by the fact that in hundreds of experiments in different parts the application of potash to the cereal crop has rarely proved beneficial—while the percentage of phosphoric acid is low. Nitrogen, as a rule, exists only in fair quantities, but the application of nitrogenous manures, even on land which has been in cultivation for 40 years or more, has rarely shown profitable results. This is generally attributed to the fact that a relatively large percentage of the nitrogen is in an available form, and that the nitrifying bacteria are unusually active, thus replenishing the supply.

The fact that up to the present phosphatic fertilisers alone have been required, and that it is necessary to apply but limited quantities of this—usually from 80lbs. to 120lbs. per acre—reduces the outlay on fertilisers to an average of about 4s. per acre. Fully 95 per cent. of the fertiliser used consists of superphosphate (mineral, bone, and guano), or other form of phosphate, in which the greater portion of the phosphoric acid is soluble in water.

The demand for phosphatic fertilisers has been met by the importation of the manufactured article and of mineral phosphates for treatment locally. It is probable, however, that in the near future South Australia will be largely self-supplying in this respect, as phosphatic deposits have been discovered in numerous localities, and several of these are now being worked with satisfactory results. During 1907 about 7,000 tons of local phosphates were converted into fertilisers or exported to other parts of the Commonwealth for this purpose.

S. A. Oats, Photo.]

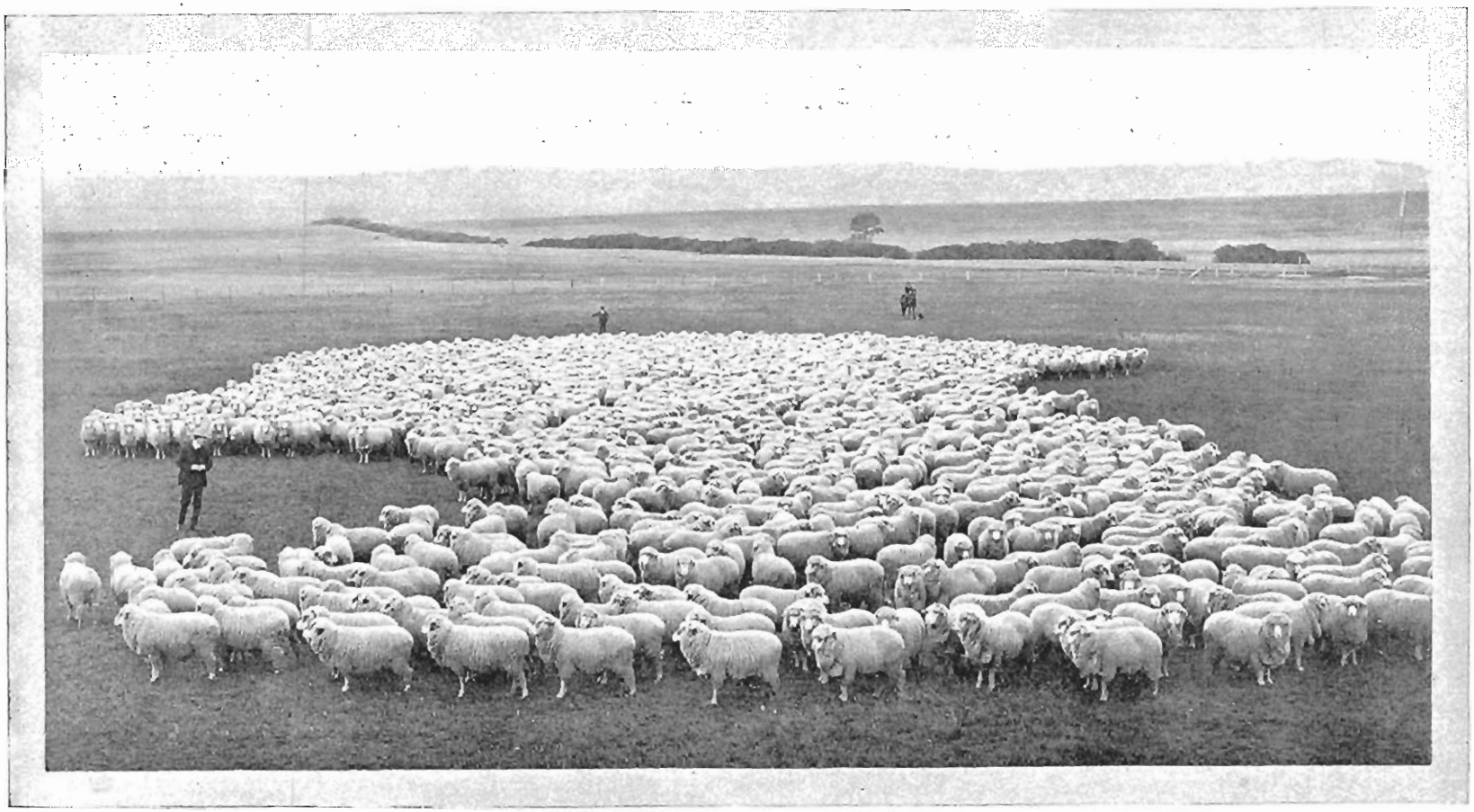
A TYPICAL MERINO FLOCK.



C P. Scott, Photo.]

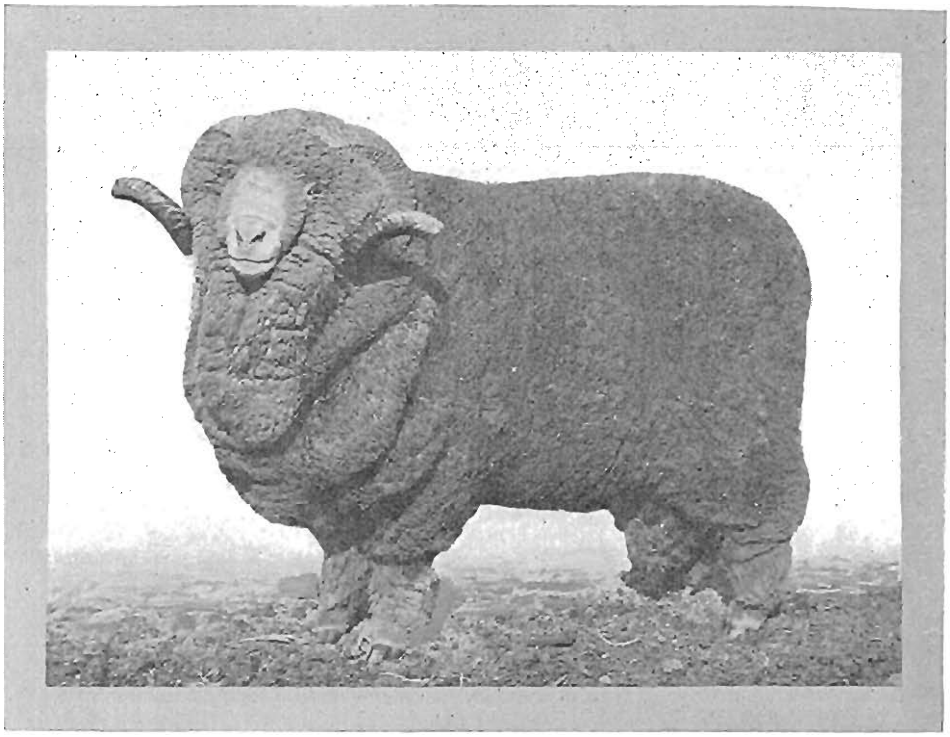
The South Australian type of Merino is noted for its large frame, robust constitution, and profitable fleece. The production of wool in 1907 exceeded that of any previous year, reaching a value of nearly £2,000,000.

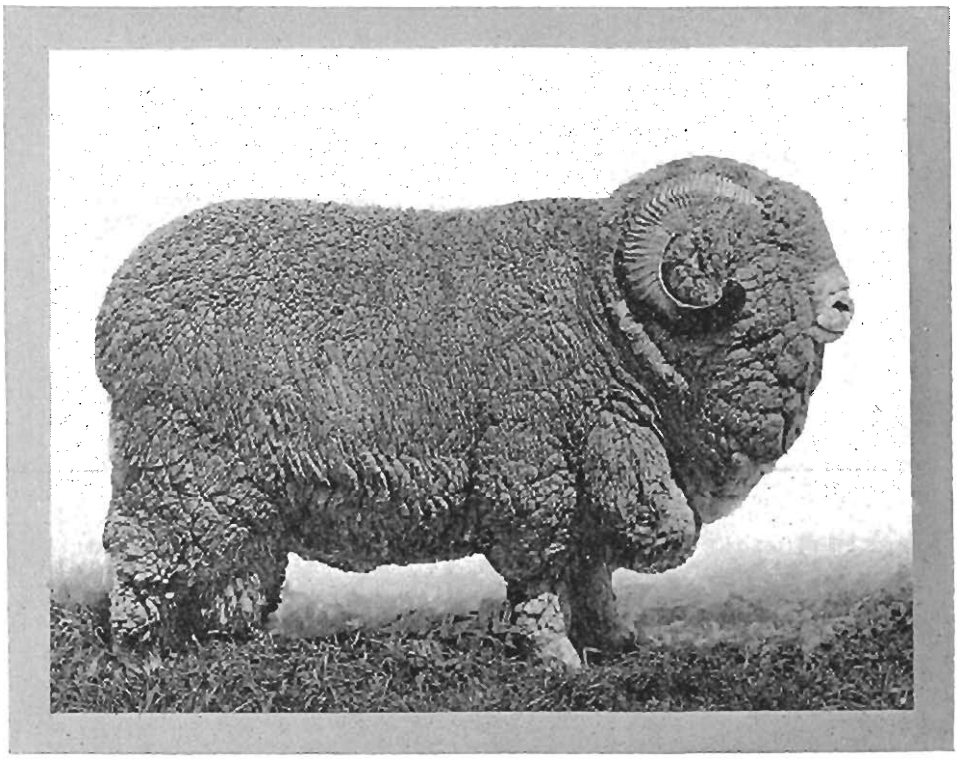
A FLOCK OF SOUTH AUSTRALIAN MERINO WETHERS.



C. P. Scott, Photo.]

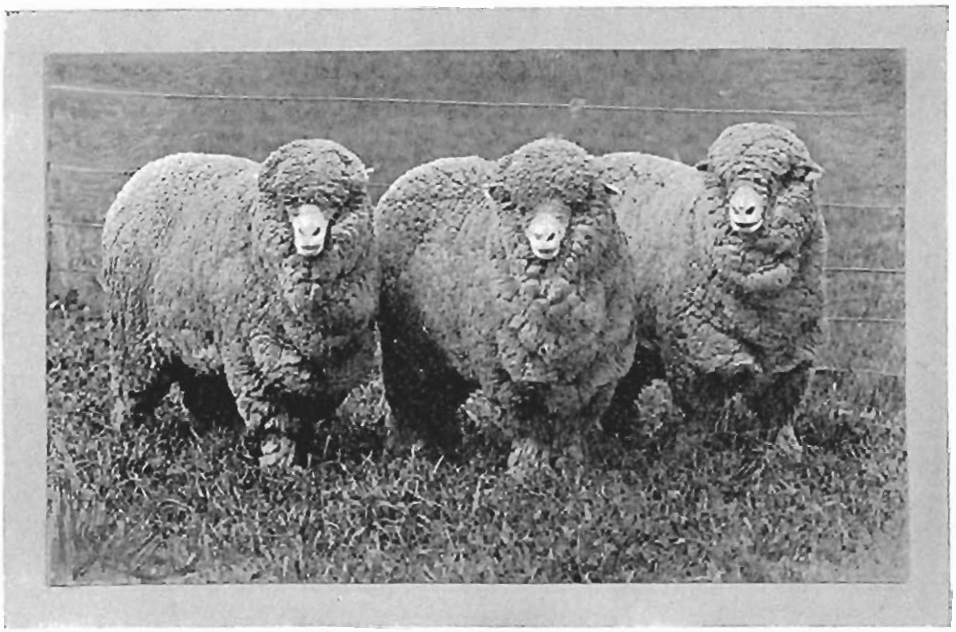
TYPICAL SOUTH AUSTRALIAN MERINO RAMS.





C. P. Scott, Photo]

MERINO EWES.



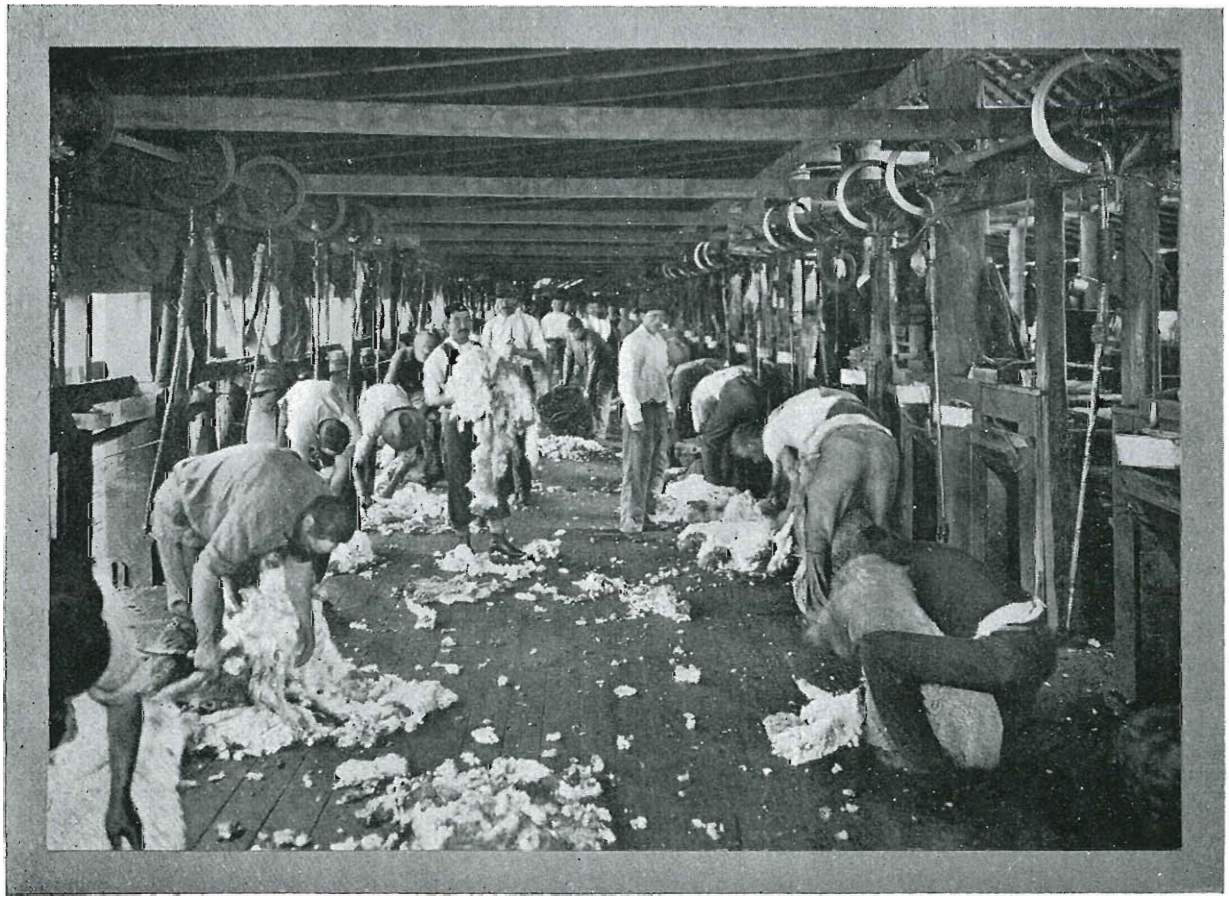
C P. Scott, Photo.]

THE PASTORAL INDUSTRY.

The pastoral industry is one of great magnitude and is second only to cereal production, the gross annual returns last year exceeding three millions sterling. Wool is the chief factor in this total, the year's clip amounting to 155,112 bales, of an estimated value of £1,850,000.

The value of sheep and cattle killed for home consumption and for export exceeds three-quarters of a million sterling, while horse-breeding is another important branch of this industry.

SHEARING SHEEP WITH MACHINE SHEARS.



On some of the larger sheep stations from 4,000 to 6,000 sheep are shorn during a single day, and the total for the season may reach 200,000.

South Australian sheepbreeders have reason to be proud of the high quality of the wool produced in this State. The main bulk of the sheep are pure Merino; but the skill of our breeders has resulted in the development of special types of the breed of large frames and carrying good fleeces of a profitable class of wool, for which there is a strong demand. These sheep are robust, very free from disease, and well adapted to the climatic condititions of the country.

In the wetter districts the Lincoln and other long-wool breeds are kept, both as pure flocks and for crossing with the Merino.

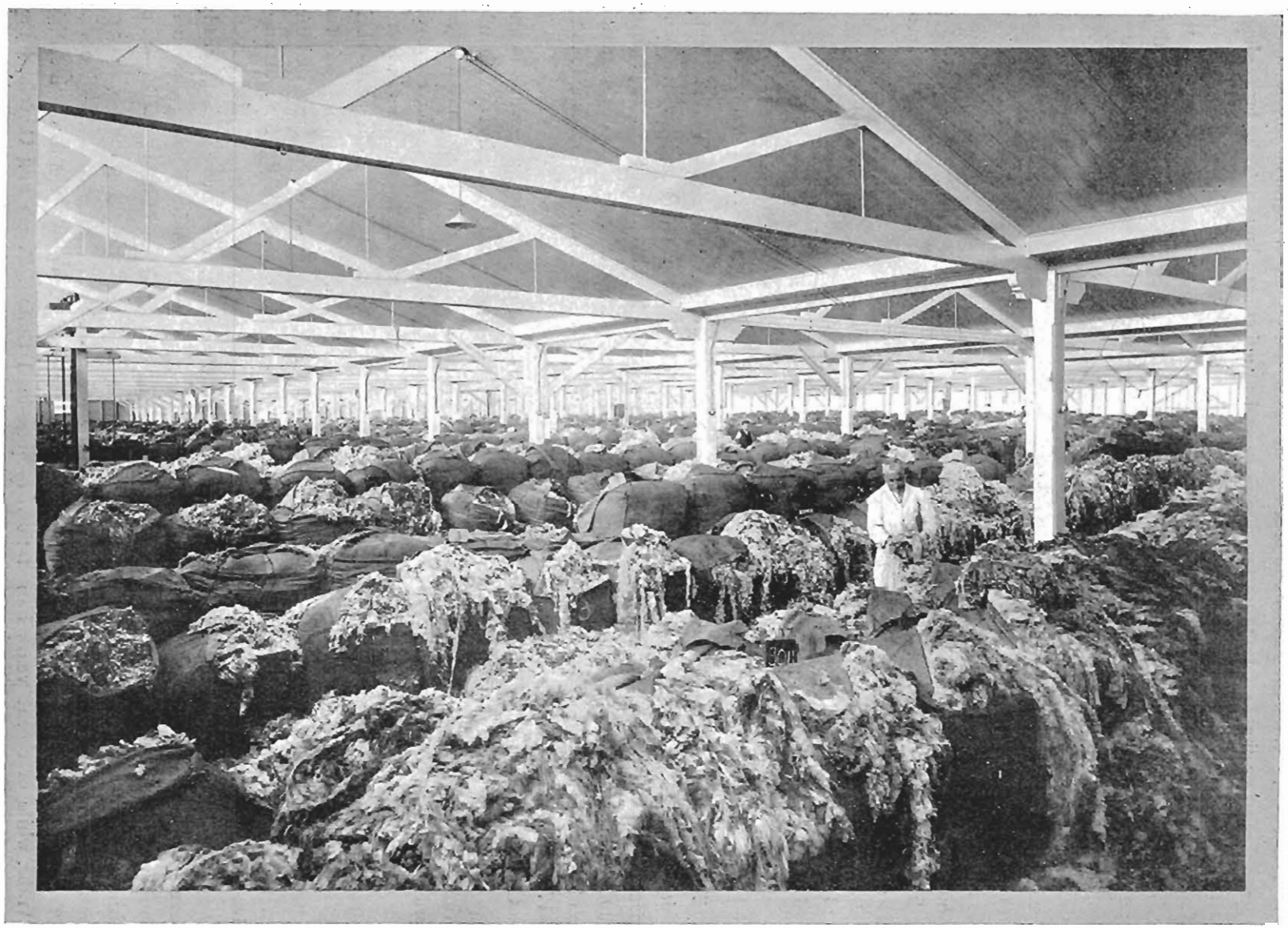
The average return of wool per sheep (including lambs) last season was equal to 7·55lbs., while average amount paid at the local sales was 8·8d. per lb. of greasy wool.

PREPARING THE WOOL FOR MARKET ON A LARGE STATION.

As the wool varies in quality, not only on different sheep, but also on the different parts of the body of the same sheep, it is necessary, in order to secure the best returns for the wool to "class" it according to quality and type. This requires the services of persons trained to the work. The above shows the operation of wool-classing on a large station.

Of the 6,625,000 sheep in South Australia, a large number are kept by farmers combining cereal-growing with sheep-farming, more especially the breeding of lambs for the export market. This industry is of comparatively recent development, being an almost natural outcome of the adoption of the three-year rotation, viz., grazing, fallowing, and cereal-growing. The use of phosphatic manures for the cereal crop has resulted in a marked increase in the herbage on the stubble lands, rendering the grazing of sheep a very profitable industry, and to-day most farmers

A WOOL STORE AT PORT ADELAIDE—A BUYER EXAMINING THE WOOL PRIOR TO SALE.



Govt Photo.] Over 15,000 bales of wool were exposed in this store prior to one of the 1907 auctions.

keep a few sheep. With the farmer the breeding of lambs for export is an important item, and has proved most profitable. For this purpose the usual practice is to buy from the large sheep stations large-framed Merino ewes and mate them with rams of the Down breed—the Shropshire having up to the present been most favored. The bulk of these lambs are dropped at the beginning of winter and are exported in September and October as "milk lambs," that is, they are suckled by the ewes right up to the time they become fit for export. The natural pastures are mainly relied upon, but rape and other green crops are grown. In the drier areas the object of the farmer is to get his lambs away before the summer sets in and the seeds of the grass and other herbage mature. In the cooler districts the Longwool rams are largely utilised for crossing with the Merino ewes for the lamb trade. There is undoubtedly room for a very large development in this section of the agricultural industry, as South Australian lambs realise high prices on the London market.

The following figures show the development of the lamb export trade during recent years :—

	Carcasses.		Carcasses
1896	10,606	1904	193,740
1898	38,620	1905	227,383
1900	94,597	1906	251,569
1902	116,843	1907	271,629

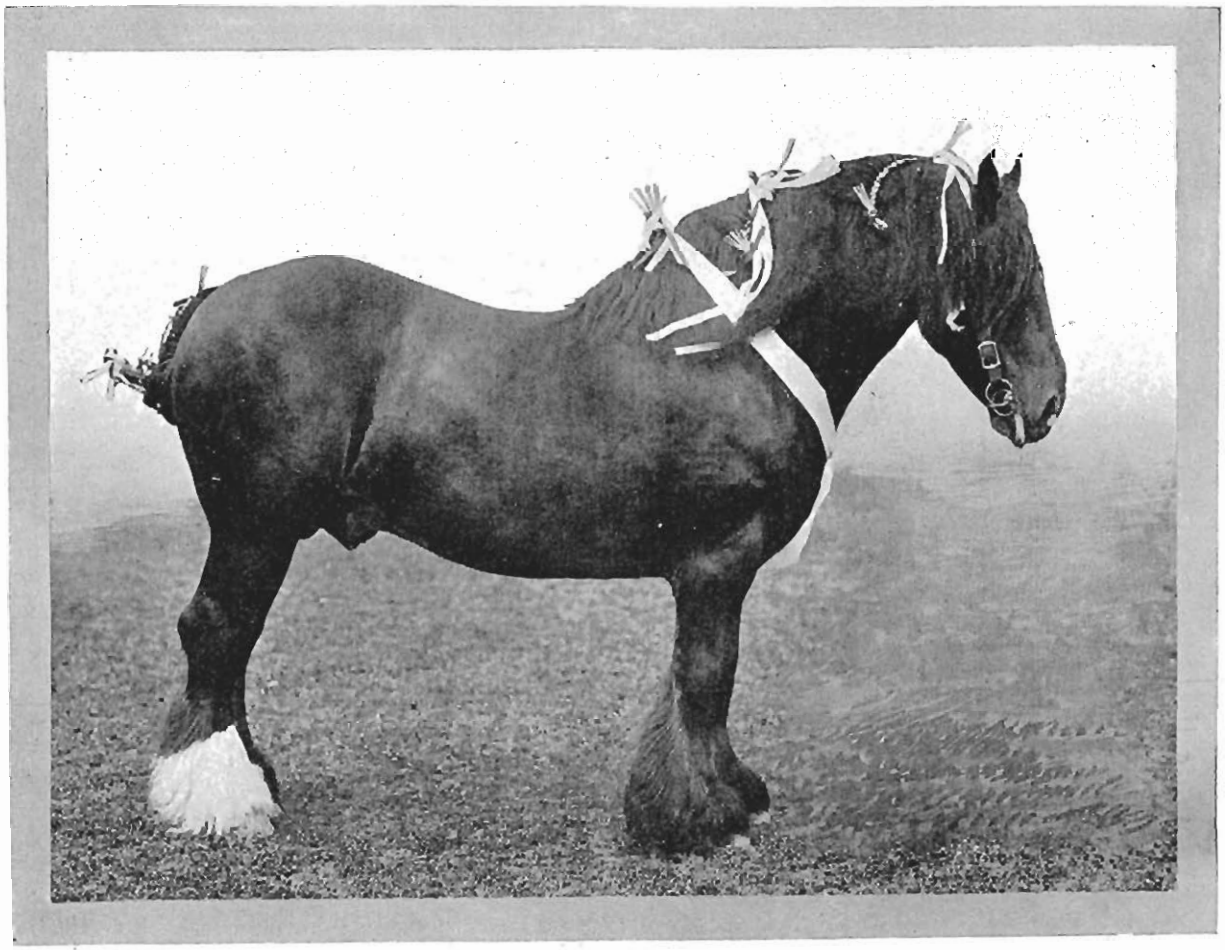
The greater portion of the wool produced in South Australia is now sold in Adelaide by public auction. These sales are held during the months of September, October, November, and December, and attract buyers from all parts of the world. On November 11th, 1907, over 30,000 bales were offered; this is believed to be the world's record for a single day's auction sale of wool. The total quantity of wool sold during the past season at the local sales amounted to 117,666 bales, and the price paid reached £1,500,000.

Considerable attention is given to the breeding of horses, not only on the large stations and studs specially devoted to this industry, but also by the farmers themselves. The heavy demands of the remount service of the Indian Army for horses for the artillery and the mounted forces afford a profitable outlet for large numbers of horses annually. Australian horses have proved their hardiness and worth, not only in India, but in other parts of the East as well as in South Africa. The majority of the farmers here rear a few foals every season—some to keep up their teams to the required strength and others for sale. Generally speaking, the Clydesdale is the foundation of the farm horses of South Australia. For heavy work pure-bred or three-quarter-bred Clydesdales are mostly used, but for general work in many districts a lighter and more active animal is desired. Any good, sound, heavy, or medium heavy animal meets with a ready sale at a profitable figure, not only for local use, but also for export, while there is also a ready demand for good light horses. The importance of the industry is shown by the large numbers of public sales of horses throughout the State, the annual sale at Kapunda being the largest of its kind in Australia, over 2,000 horses being disposed of at last year's sales, the proceedings extending over a week. The fame of the Australian thoroughbred horse is world-wide, and South Australia possesses several studs of repute. Some attention is also given to the breeding of Arabs, while of recent years importations of pure-bred Suffolk Punch and Cleveland Bay horses have been made, and several small studs established.

Much of the inland portions of South Australia is admirably adapted to the breeding of cattle, though up to the present sheep have received more attention from the pastoralist. The number of cattle (other than milch cattle) shown in the statistics is 227,881, an increase during the past 10 years of over 80,000. The number of milch cattle is given as 97,843. Herefords and Shorthorns are bred for beef production, while the milch cows consist mainly of Shorthorns and Jerseys and crosses between these breeds. The Ayrshire and Holstein are also used for crossing, while a number of pure-bred herds of each exist.

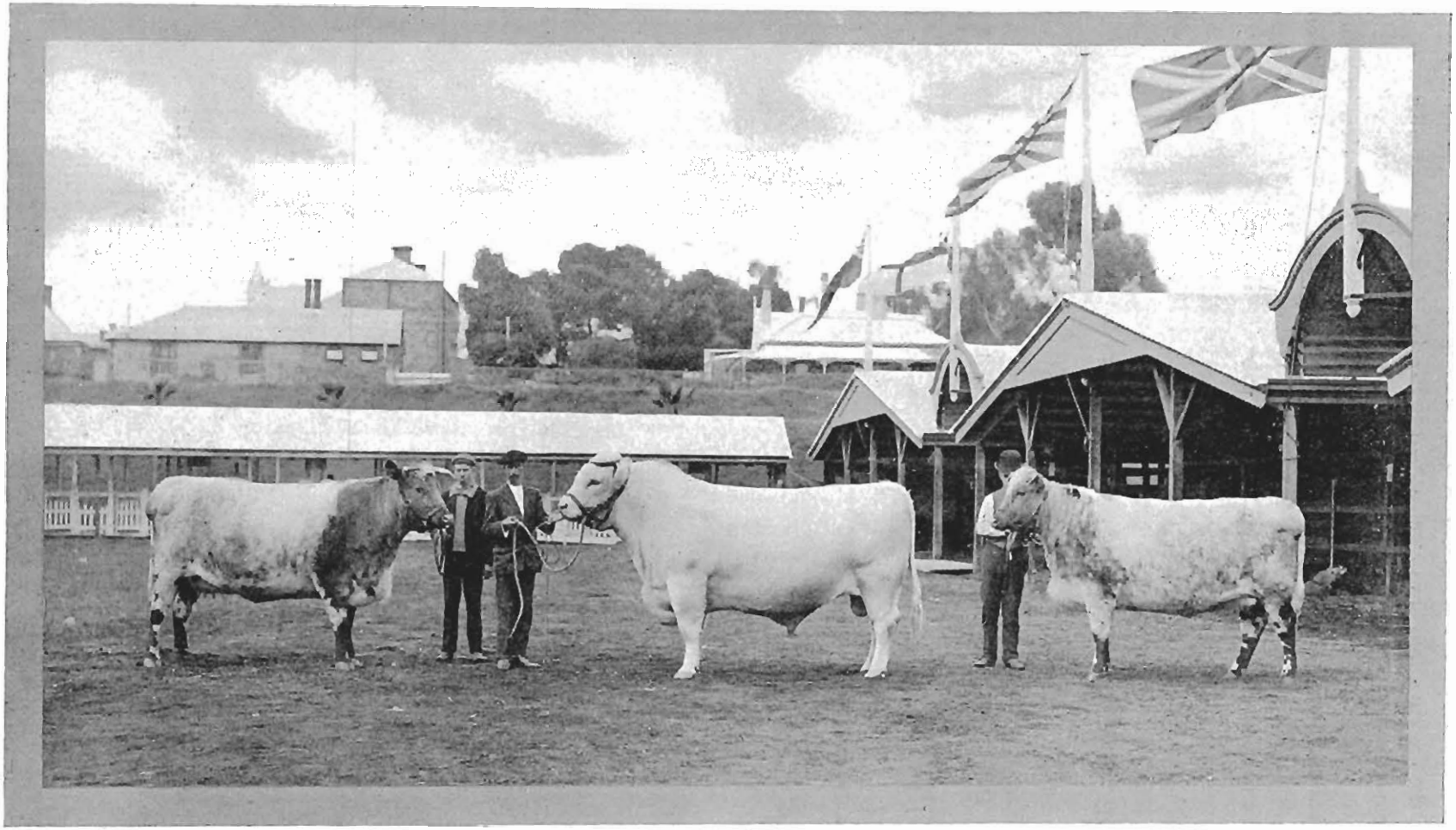
To the man with a fair amount of capital and a liking for an open-air life the breeding of stock in South Australia offers exceptional inducements. The life is free and healthy, the breeding and improvement of the flocks and herds possess a special fascination, while with the exercise of judgment and skill profitable returns are assured.

CHAMPION CLYDESDALE, "IAN HAMILTON."—ADELAIDE, 1907.



W. S. Smith, Photo.]

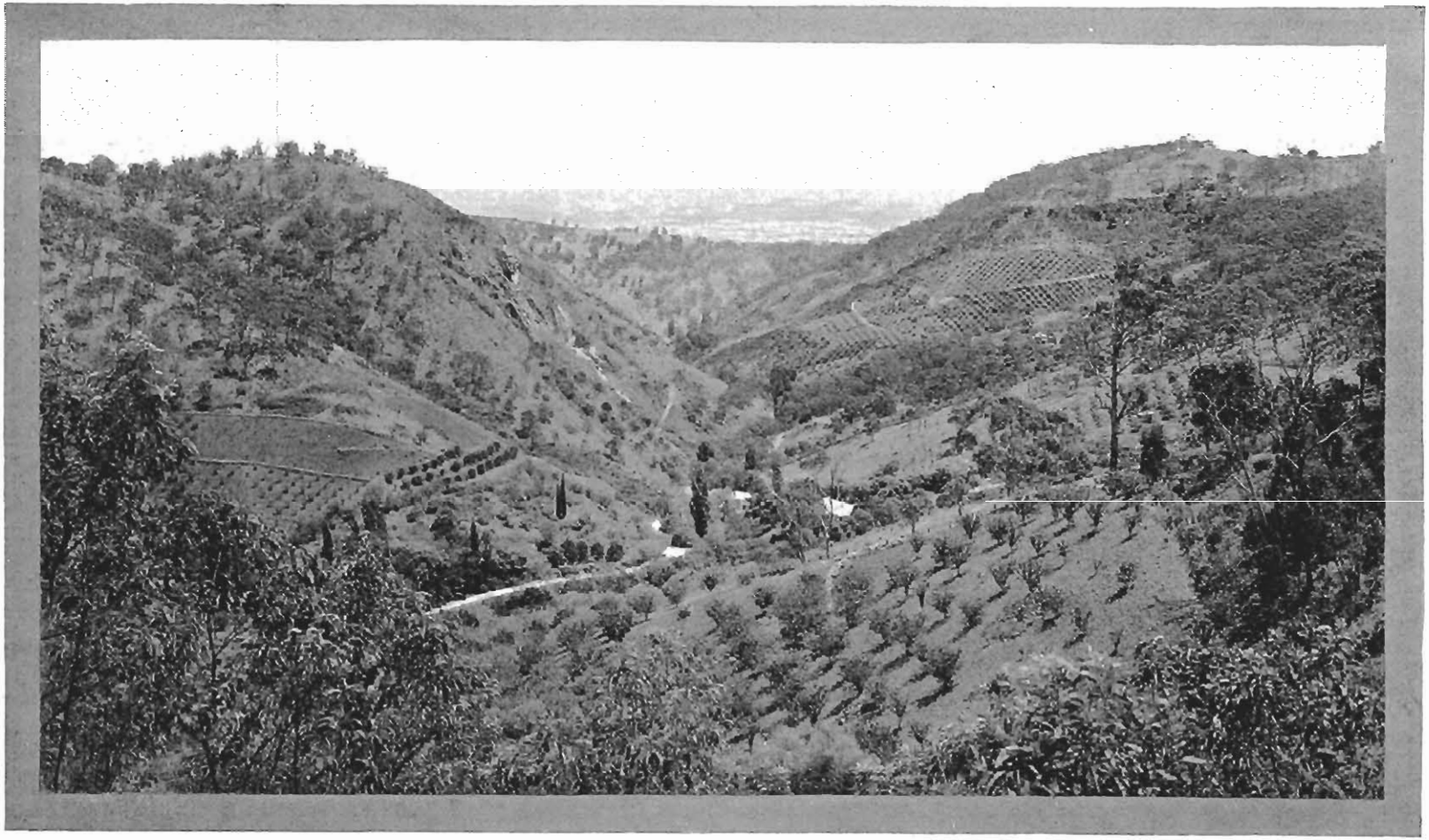
A GROUP OF CHAMPION SHORTHORN CATTLE BRED BY THE LATE J. H. ANGAS.



Krischock, Photo.]

South Australia possesses a number of high-class cattle of different breeds. Competent judges have expressed the opinion that some of our stock would more than hold their own at any English show.

ORCHARDS ON THE HILL SLOPES NEAR ADELAIDE.



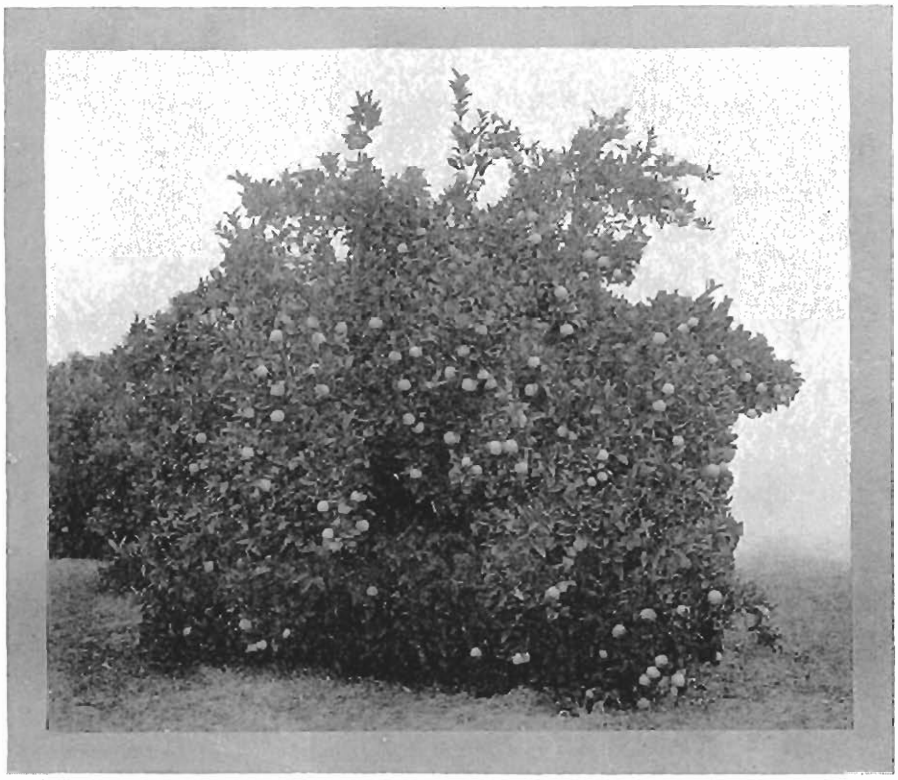
Govt. Photo.]

In the Mount Lofty Ranges (within a few miles of the city) there are some thousands of acres of orchards. Apples, pears, cherries, and plums grow to perfection on these hill slopes.

FRUIT-GROWING.

It may be confidently asserted that no portion of the world is more admirably suited to the production of a very wide range of those fruits which belong to the temperate and sub-tropical zones than is the State of South Australia. Let the horticulturist of Europe or North America imagine strawberries, cherries, apples, pears, walnuts, gooseberries, plums, apricots, peaches, quinces, loquats, almonds, olives, figs, grapes, oranges, lemons, and mulberries—all growing together on a 10-acre block, and with no aid save that afforded by the natural rain and sunshine bringing their fruits to the very highest state of perfection—and he will realise not what can be done, but what is a common result obtained in many of the gardens in the hills and gullies near Adelaide.

A PROFITABLE ORANGE TREE.



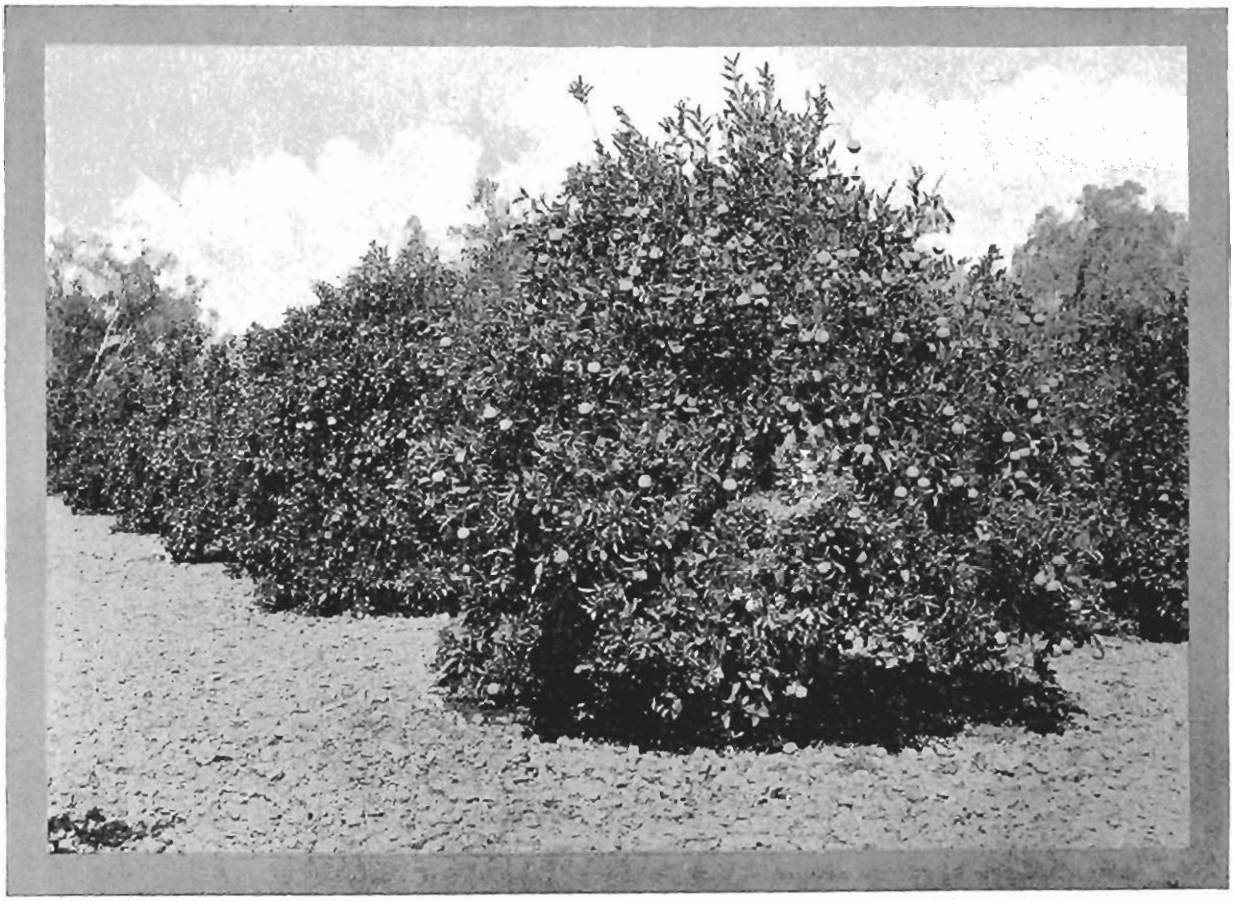
Govt. Photo.]

In the 400 miles of country which stretches from Penola or Mount Gambier in the south-east to Wirrabara in the north, are included thousands of acres of land with possibilities for fruit production almost incalculable. Within that area are encountered all the varying conditions of rainfall, soil, and sun heat requisite to the many phases of fruit culture; and this great range of climatic conditions affords opportunities for specialisation. The growth of the industry—since it has been recognised as such—has been along these lines, until now we find groups of fruit-growing centres clearly defined, both in their areas and in their productions. In these, the cultivation of fruits hailing from colder zones chiefly follows the elevated lands, while the heat-loving sorts find congenial surroundings upon the sunny plains between the ranges, to an extent only limited by the supply of available moisture in the soil. In the south-eastern portion of the State, the apple, pear, and plum reach that perfection which has been usually considered a privilege of colder countries only.

At the Coonawarra Fruit-growing Colony—established about 18 years ago near Penola—there are hundreds of acres of orchards grouped in one continuous area. From this centre thousands of cases of fine apples are annually exported to countries outside Australasia. Situated within a mile of the Government railway line, ready facilities for transport are handy, while in other respects the settlers enjoy a community of interest not possible in more scattered localities. The rainfall here is abundant, reaching about 27in. per annum. The intending settler can secure such land at about £5 per acre upwards. The cost of preparatory tillage, trees, planting, and fencing against domestic animals and vermin, would range from £8 to £10 per acre.

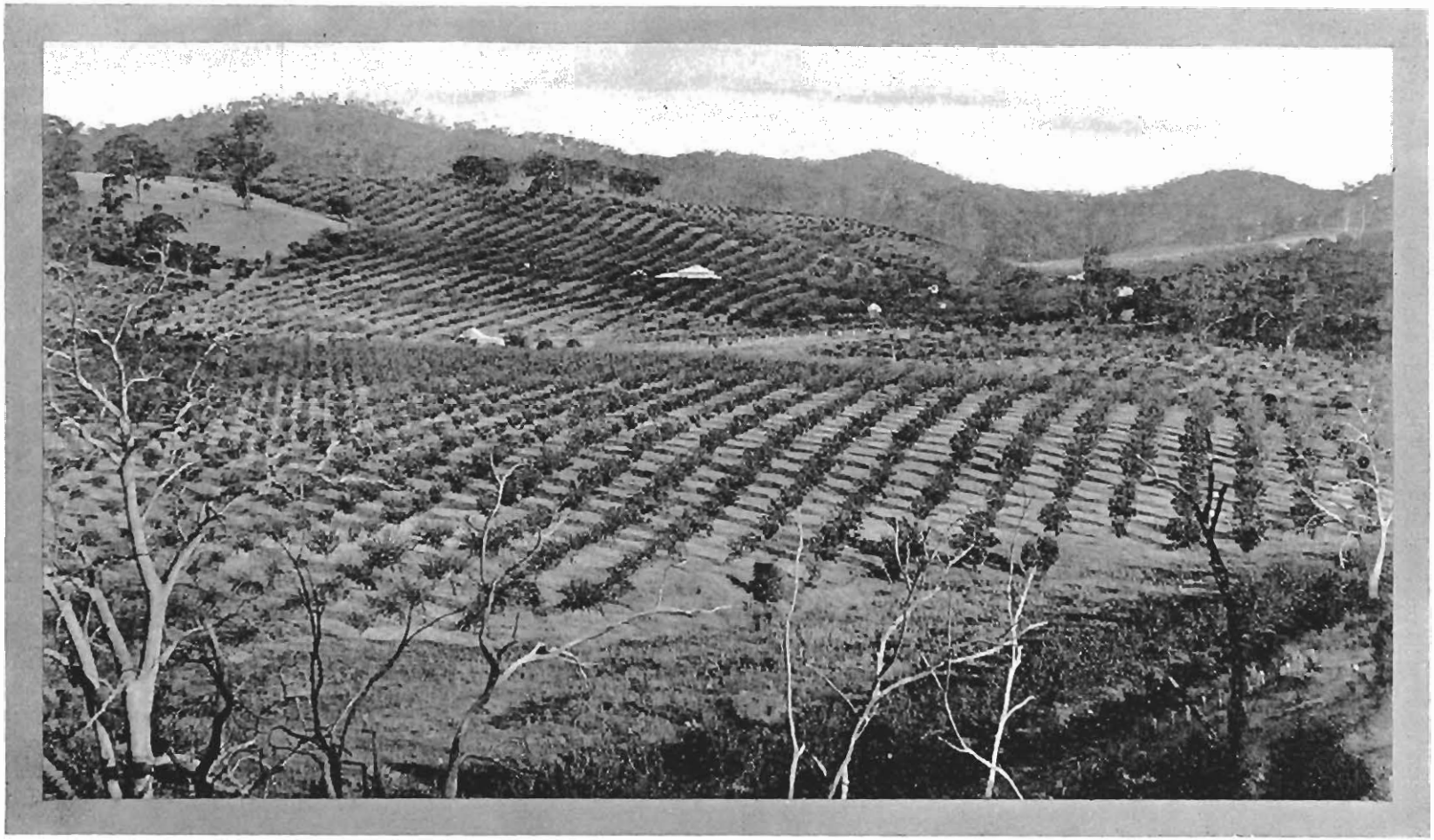
Further north across the Murray River, in the ranges which arise near Cape Jervis, and pass behind Adelaide to Gumeracha—a stretch of about 100 miles in length—abundance of fine land most suitable for fruit-growing is located. This country is favored with a rainfall which varies in different parts from 25in. to 35in. per annum. In consequence, the land is usually heavily timbered, and although the purchase-money may be as low as £3 per acre in places, the expense of clearing and preparing the land usually brings the cost of constituting an orchard up to £20 to £30 per acre. Against this, however, must be set off the greater variety of fruits which may be grown, the advantages afforded by the close proximity to Adelaide markets and the central depôt of railway distribution throughout the State, as well as the nearness to the port of shipment by steamers trading with European and other oversea countries.

VIEW IN AN ORANGE ORCHARD.



Govt. Photo]

A VIEW OF APPLE-GROWING COUNTRY NEAR KERSBROOK.



Govt. Photo.]

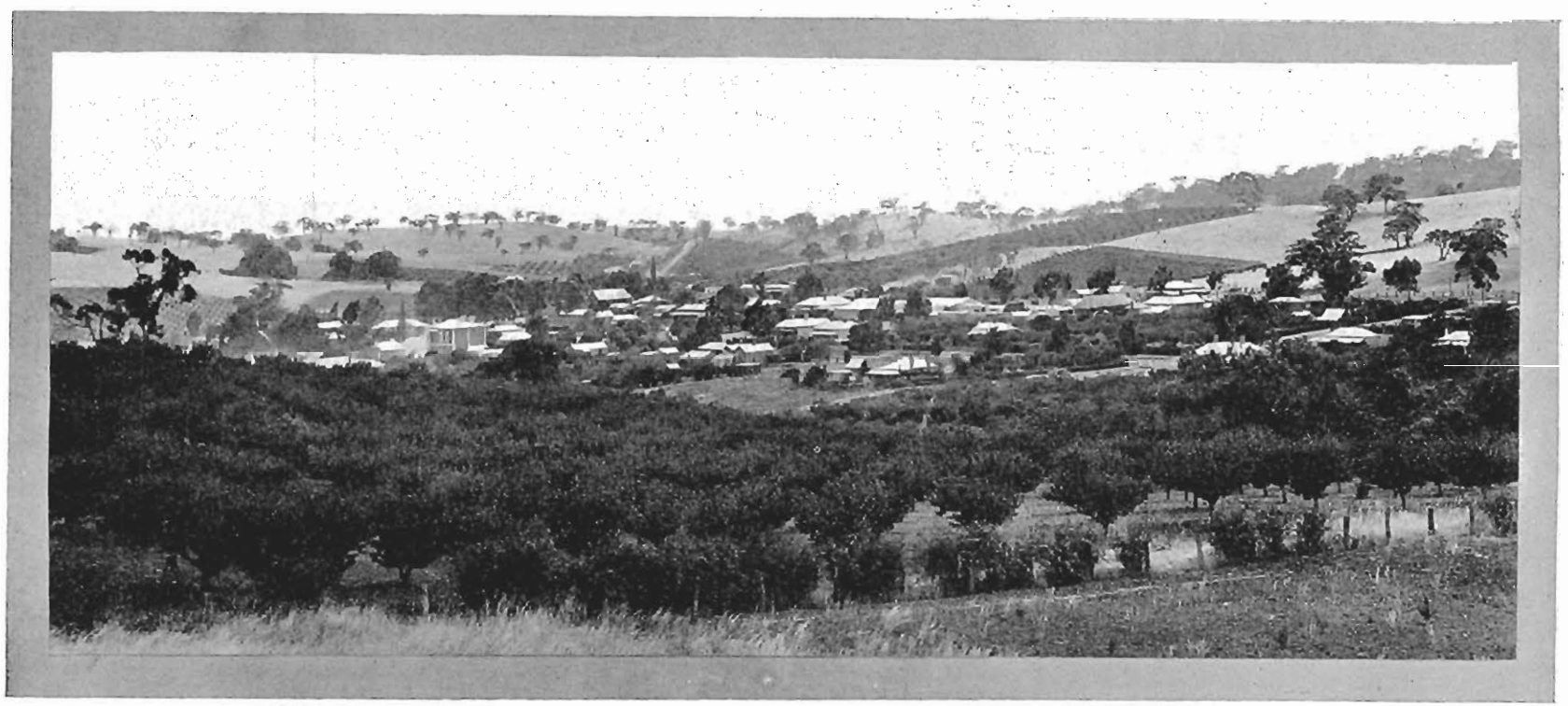
South Australia has 7,600 acres planted to apple trees, and there is room for a large expansion of this industry. An English orchardist of many years' experience stated recently that he had visited various fruit districts in Canada, United States, and Australasia, and nowhere did he find better prospects for extension of the apple industry than exist in South Australia.

On the plains which lie between these ranges and the shores of St. Vincent's Gulf a new zone of production is encountered. Here, with an annual rainfall of a little over 20in., and a much higher summer temperature, the table grape, fig, peach, apricot, and pear reach a very high degree of perfection, possessing a flavor seldom met with in any part of the world. The olive and almond are also grown here with much success. On the alluvial soils which have been formed by the overflowing and shifting of the beds of the Torrens, Para-Para, and other streams which emerge from the Mount Lofty and Barossa Ranges, the orange, lemon, and other citrus fruits attain the highest degree of excellence, both in quality and quantity. The rich, deep orange-red color of the oranges grown on these lands is seldom reached, and never eclipsed, in other citrus-growing countries. To produce such results, artificial watering is called to the assistance of the orchardist. On these plains the growers chiefly resort to pumping water from wells —in which abundant supplies are almost invariably found at depths varying from 20ft. to 50ft. from the surface. Besides these supplies, these districts are largely reticulated with water mains from the Government reservoirs, and, although at present the price of water is too high for profitable fruit culture, the presence of these supplies is an insurance against drought or injury from the sudden failure of growers' private supplies. Land for grape, fig, peach, and apricot growing may be obtained even within five or six miles of Adelaide, at from £10 an acre upwards; but the rich alluvial lands suited for citrus trees range from £50 per acre upwards. If evidences of prosperity are reliable data, even at this rate the fortunate owners of such soils are to be envied.

A little further north the Barossa district is located in a range which runs almost continuously from the Mount Lofty Range. Here, around the townships of Angaston, Keyneton, Nuriootpa, and Tanunda, large orchards are established. The raisin and currant grapes, the peach, apricot, pear, apple, plum, and fig, meet with ideal conditions in these localities. A rainfall of from 20in. to 30in., according to the elevation reached, supplies—when aided by judicious tillage—the necessary moisture. A well-balanced season of summer heat favors the development of rich saccharine flavors in the soft fruits, and firm, good keeping and carrying qualities in the apples, while at the same time it provides the necessary heat to produce a well-colored highly-finished product in the form of evaporated fruits. In this district land values vary from £5 to £20 per acre, while the cost of preparation and subsequent tillage is cheap.

About 70 miles north-west of Adelaide the ranges of the Stanley district begin at Saddleworth and run northwards for about 35 miles through some of the finest land for fruit production in South Australia. Here an annual rainfall of from 20in. to 27in. is precipitated. On the spurs of the undulating hills the apple, pear, plum, apricot, and peach do well, while on the richer flats and gully lands the Zante currant vine produces enormous crops of fruit, equal in quality to the finest grown in the Grecian Islands. This district contains vast areas of land suitable for these fruits, and so great has been the demand for blocks for fruit-growing that the land values have reached a high figure. The initial cost is from £5 to £15 per acre for the unplanted soil, but the slopes and valleys lend themselves to cheap tillage, and the establishment of the orchard may be estimated to cost from £15 to £25 per acre in consequence. The road routes to the main north line of railway lead through Farrell's Flat and Mintaro, at a distance of about 12 miles, or to Saddleworth, which is from eight miles to 35 miles from different portions of the district. About 50 miles further north the Wirrabara and Beetaloo ranges of hills possess much good fruit-growing country. Here apples, pears, grapes, plums, figs, peaches, apricots, oranges, and

A VIEW IN ANGASTON DISTRICT.



Govt. Photo.]

To the energetic man with a few hundred pounds fruit-growing in South Australia can be recommended with confidence. One of our most experienced orchardists is responsible for the statement that "Ten acres of good land, well planted and properly cared for, will afford a comfortable living to any man not afraid of a little hard work."

lemons thrive in selected spots, which are chiefly in the gullies and flats alongside the Rocky and other creeks. The rainfall here varies from 20in. to 23in., and the wet and dry seasons are well defined. Although many miles from the point touched by steamers which carry fruit cargoes to Europe, a profitable export in apples has been entered upon from this district. The fruit-growers in this neighborhood command a large local market, being in close proximity to Port Pirie, and in direct railway communication with the great mining centre of Broken Hill.

PACKING APPLES FOR EXPORT.

R. H. Ball, Photo]

All the foregoing areas over which fruit is produced are grouped along and among ranges of hills, the elevation of which ensures more regular rainfall and cooler atmospheric conditions than are met with in the open agricultural plains. Apart from these places, however, along the valley of the Murray River are established a number of irrigation settlements largely devoted to fruit raising. Here the conditions are peculiar, and a distinct type of growth is secured under the stimulating influences of irrigation and great summer heat. After passing through many vicissitudes of fortune the inhabitants of these settlements appear to have solved the problem of what they can produce successfully, and with characteristic zeal and intelligence their energies are now being directed along these lines. After experimenting with nearly every kind of fruit they have emerged out of their difficulties with the knowledge that with their conditions the production of currants, raisins, pears for canning and drying, and citrus fruits may be carried on with much success indeed. It was from here the Washington Navel oranges originated, which a leading English journal declared to be "Undoubtedly the finest oranges which had ever entered Covent Garden markets."

To any person who contemplates emigrating from Europe, and more particularly to those who may possess a few hundred pounds capital, there is in this business an abundant field for his enterprise. To make a success the beginner must not be afraid of hard work, and should he have received some initial training in horticulture, success is assured. Our most successful fruit-growers are men who, although starting with very limited means have, by dint of hard work and the application of keen intelligence, raised themselves to their present position of comparative affluence. There is yet as good land awaiting the skill of the planter as any now set to orchards, and the world's markets are being yearly brought into closer touch with the South Australian producer. Blessed with a climate to the evenness of which the world offers no parallel, the fruitgrower may, on a properly chosen site, have something to send to market every month in the year, thus securing a continuous income, which is such an important consideration to the man of small capital. When added to all these undeniably great natural advantages it is considered that the newcomer may at once begin with a clear knowledge of the results of the accumulated experience of upwards of half a century's work, it must be admitted that he starts equipped with all the forces which are essential to success. The rest depends entirely upon himself.

A recent visitor to South Australia (a fruit salesman of nearly 50 years' experience in Covent Garden, England) stated he had no hesitation in saying that the South Australian apples were superior to any others he had received from Australia. This gentleman also expressed the opinion that there was almost unlimited room for expansion in our export trade.

A LARGE CONSIGNMENT OF EXPORT APPLES ON THE WAY TO PORT.

R. H. Ball, Photo.]

VINEYARDS ON THE HILL SLOPES ABOUT FOUR MILES FROM ADELAIDE.

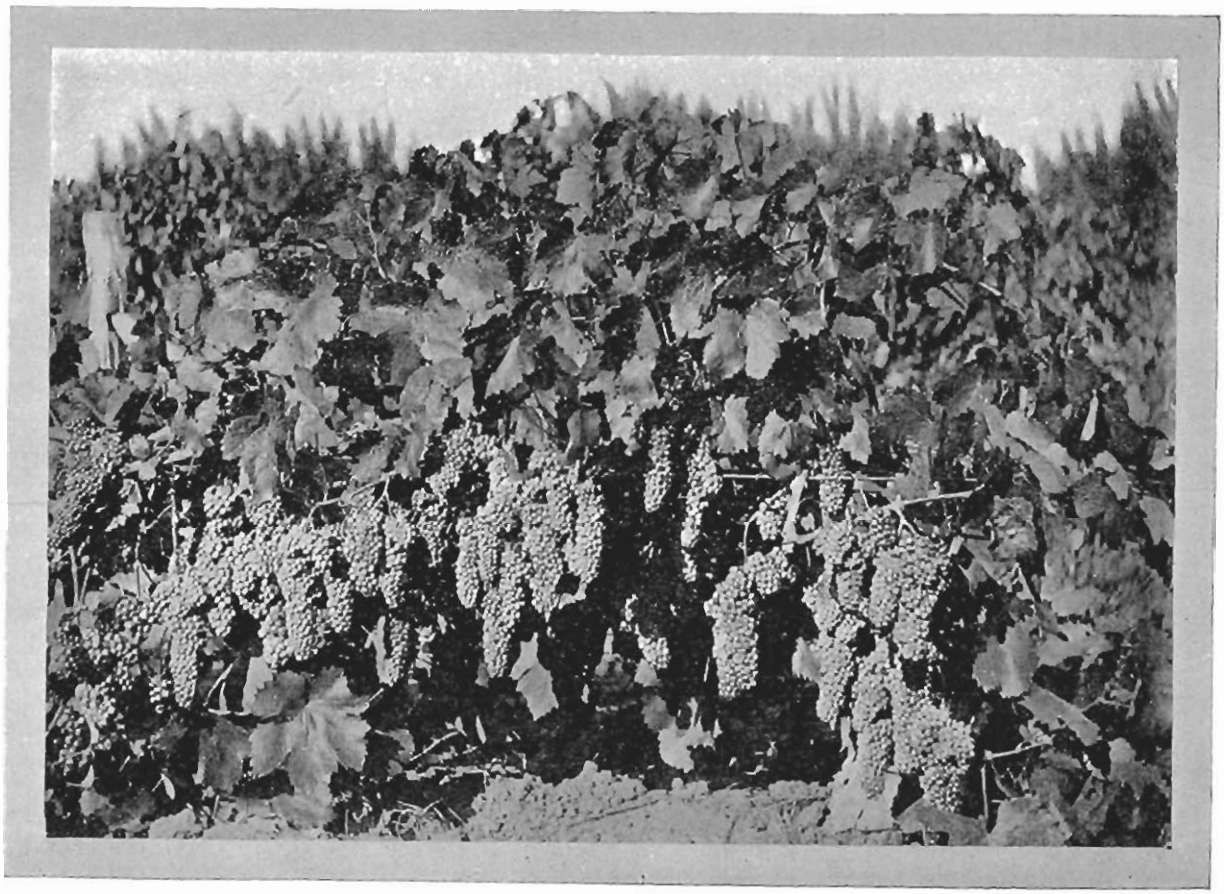
Govt. Photo.]

A number of vineyards and wine-making establishments are situated on the slopes of the Mount Lofty Ranges, within a few miles of the city.

A PORTION OF THE LARGEST VINE IN AUSTRALIA.

R. H. Ball, Photo.]

A HEAVY CROP ON A CURRANT VINE.



Govt. Photo.]

VINE-GROWING.

The suitability of the soil and climatic conditions of the Southern districts to the cultivation of the vine was recognised by those of the pioneers acquainted with the south of Europe. As far back as 1846 wine was made at the Reynella vineyards, the credit of introducing the first wine grapes and of making the first wine in South Australia being given to the late Mr. John Reynell, after whom the district of Reynella was named. During late years the annual vintage returns approximate to 2,500,000galls.; the area under vines exceeding 22,000 acres.

Brandy to the amount of 200,000galls. is produced, and this meets with ready sale on account of its purity and high quality. A large export trade with the neighboring States is carried on. Many thousands of gallons of vinegar are also made from the local vintages.

South Australian wines have won a high reputation throughout Australasia and New Zealand, and our successes at the various inter-State exhibitions and special wine shows have proved splendid advertisements for our wines. In Great Britain South Australian wines are well known, and an extensive export trade is done. This trade is not so large as was the case some years back, partly owing to the very marked increase in the inter-State trade since Federation, which has provided an outlet nearer home.

A large amount of capital has been invested in wine-making and distilling plants, and some of the establishments are of very considerable magnitude. The largest and most complete of these is the property of Messrs. B. Seppelt & Sons, Limited, at Seppeltsfield. Here over 3,500 tons of grapes can be treated during the vintage season, producing up to 500,000galls. of wine. About 100,000galls. of wine is annually converted into brandy, and the stock of spirit maturing on the premises varies from 50,000galls. to 60,000galls. Pure wine vinegar is also made on a large scale, the monthly output exceeding 15,000galls. The value of such an establishment to the district and to the State is difficult to estimate. The fact, however, that over 60 persons are permanently employed, while during vintage the number exceeds 100, will convey some idea of the expenditure on labor alone. Seppeltsfield is the largest and most complete wine-making and distilling establishment in the Southern Hemisphere.

In addition to the growing of wine grapes a large area is devoted to the production of table grapes and of currants and raisins. The area under currants has extended considerably of late years, and last season's production amounted to 1,475,000lbs. South Australia possesses the largest vine in Australia, if not in the world. This vine (currant) covers a trellised area of about 1,500 sq. ft., and bears enormous crops of fruit. In a single year 510lbs. of dried currants, equivalent to 1,700lbs. of fresh fruit, have been obtained from this vine. Sultana raisins, ordinary pudding raisins, and table raisins are also produced in large quantities, and the total value of currants and raisins exceeds £75,000. Table grapes are grown to perfection in many localities, and very large quantities are consumed locally, while the export trade is also increasing. The estimated value of this branch of the industry is £40,000 per annum.

There is a very large area of land in South Australia eminently adapted to the growth of the vine, and, as we are free from all serious vine diseases as well as of the dreaded phylloxera, there is a very promising future before the industry. Land suitable for vine-growing can be purchased at reasonable rates; the cost of cultivation is low, and at ruling prices a good living can be made by an energetic man without any great outlay, as there are a large number of buyers of grapes for wine making and distilling.

VIEW OF SEPPELTSFIELD, SOUTH AUSTRALIA.

Govt. Photo.]

The above shows a portion of the largest wine-making and distilling establishment in the Southern Hemisphere. Up to half a million gallons of wine are made in the winery shown on the right of the picture. In the middle distance are the distillery and spirit cellars, while the large wine cellars and bottling rooms may be seen beyond the trees.

IRRIGATION IN SOUTH AUSTRALIA.

The possibilities of irrigation have as yet scarcely been touched. It is true that we do not possess many large running streams which can be drawn upon during the summer months, but against this there are large areas of country where underground supplies can be tapped at moderate depths, while many localities possess suitable sites where the winter floods can be conserved by means of reservoirs.

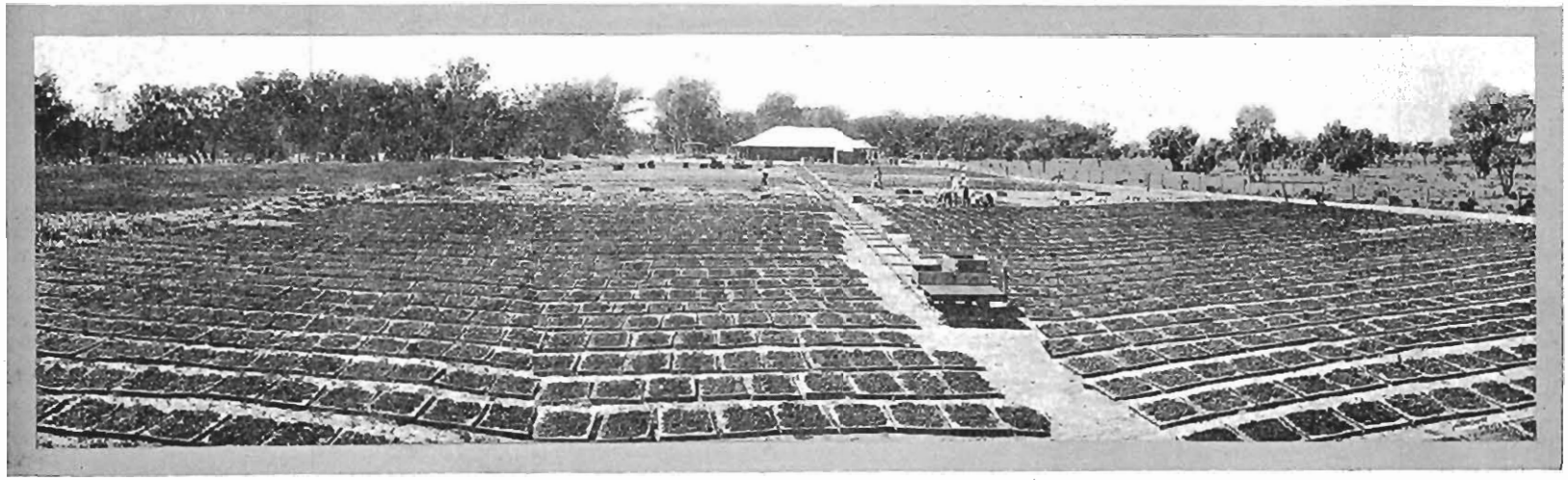
On the plains between Adelaide and the sea there has of late years been much activity in connection with the raising of green crops for dairy cows and for horse stock in the city and suburbs. Inexhaustible supplies of water are obtainable at comparatively shallow depths in wells and bores; usually the water is raised by oil engines of 6 to 10 h.p., but for the irrigation of small areas windmills are used, and of these there are some hundreds in operation.

The green crops grown under irrigation are mainly lucerne, maize, and sorghum. A well-tended lucerne field under irrigation can be cut every three or four weeks, depending upon the weather; the hotter the weather the quicker the growth, provided water is supplied. Usually five to seven cuts per season are obtained. Sorghum and maize produce heavy crops, the former up to 50 tons per acre in two cuttings, the latter up to 50 tons per acre in a single cutting. Crops of maize 12ft. to 14ft. in height are not uncommon.

W. S. Smith, Photo.]

IRRIGATED MAIZE, 15FT. TO 16FT. IN HEIGHT.

A CURRANT AND RAISIN VINEYARD AT RENMARK.



C P. Scott, Photo.]

DRYING CURRANTS ON IRRIGATION SETTLEMENT.

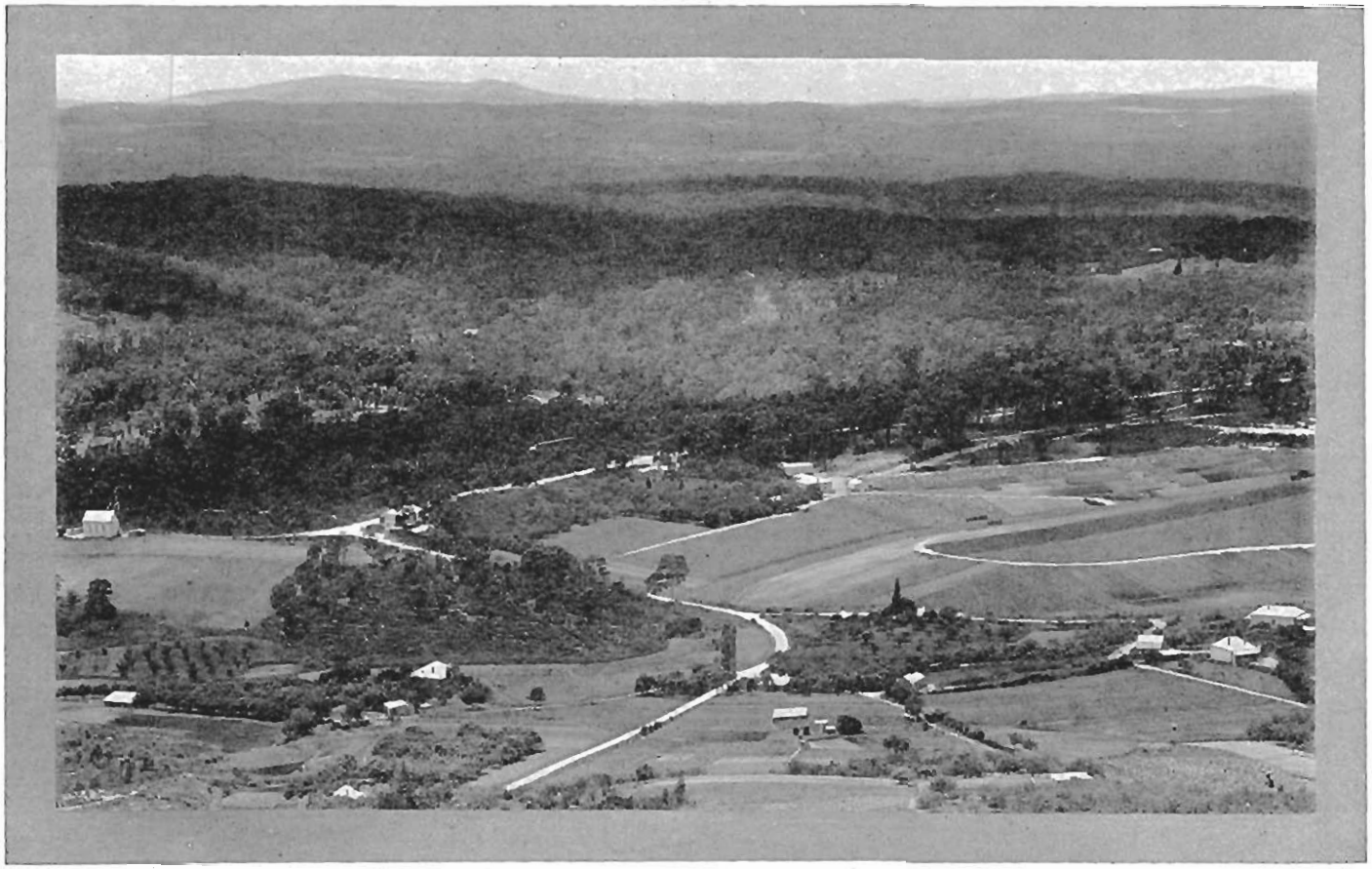
On the Adelaide plains and in the gullies in the hills the water supplies are also utilised for the irrigation of fruit trees, and for the growing of vegetables; the whole of our requirements of green vegetables for summer and autumn use being produced by the aid of irrigation.

On the River Murray we have two distinct systems of irrigation, *i.e.*, the pumping of water for the growth of fruit trees, vines, and fodder plants, as at Renmark, on the upper river, and the reclamation of the swamps on the lower reaches, the latter being irrigated by gravitation, the water being admitted by means of sluice gates in the reclaiming banks.

Our space does not permit of any lengthy reference to either system. At Renmark there are about 4,000 acres under irrigation, the whole system of pumping and delivery of the water being under the control of a trust, or board of control elected by the landowners, a rate of £1 per acre being levied to meet the cost of pumping, up-keep of plant, &c. Last season the value of the product at Renmark was in excess of £85,000 from a cultivated area of less than 4,000 acres, a good deal of which is as yet not in full bearing. The chief products are currants, sultanas, and raisins. A considerable quantity of apricots and peaches for drying are also grown, while the production of oranges for export and pears for canning and drying are likely in the near future to assume large dimensions.

The swamps on the lower reaches of the river, which can be reclaimed by the erection of comparatively low cheap embankments and watered by gravitation, are variously estimated at 10,000 to 20,000 acres, this wide margin being due to lack of definite surveys to separate the areas so available from those which require the water to be raised a few feet. These swamp lands are usually rich, and when sweetened produce heavy crops of lucerne, maize, sorghum, and other green crops, potatoes, onions, &c. As much as 9 tons per season of lucerne hay has been cut on such lands, while yields of up to 30 tons of onions per acre and proportionate returns of potatoes have been recorded. Up to the present comparatively limited areas of these swamp lands have been dealt with, but in the course of a few years several thousand more acres will be reclaimed. The valley of the Murray will, in the course of time, carry a large population engaged in the tillage of irrigated land. At present, owing to the lack of measures to conserve the flood waters which for months at a time run into the sea, the possibilities of irrigation are limited by the amount of water available in seasons of low river. Proposals to lock the river to improve navigation and conserve water for irrigation will, when carried into effect, render possible the profitable utilisation of many thousands of acres of rich land.

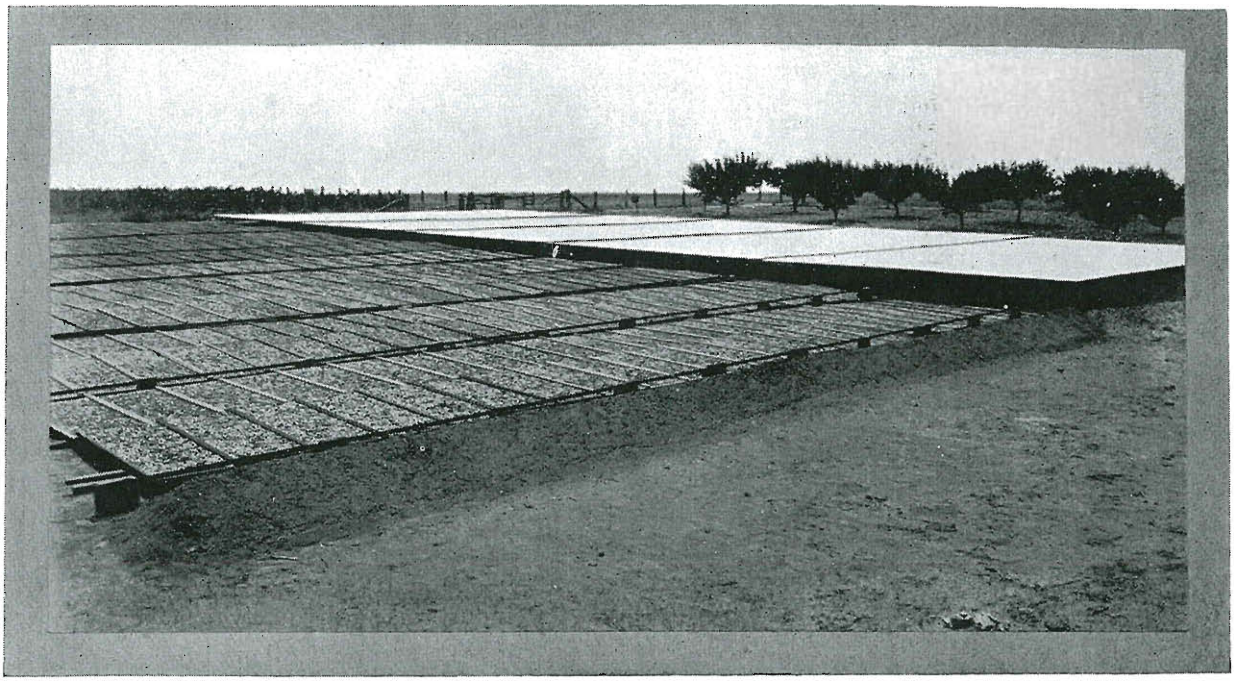
In dealing with irrigation, the Sewage Farm, four miles north of Adelaide, must be mentioned. The area of the farm is 628 acres, of which 442 acres are irrigated with the sewage from Adelaide and suburbs. The sewage is strained before being applied to the land, the average daily flow being 2,000galls. per minute, which in wet weather is greatly exceeded, owing to the impossibility of totally excluding storm waters from the sewers. The irrigated land, which is properly graded, and where necessary underdrained, is divided into paddocks of from eight acres to 25 acres, and over one mile of concrete channel and 26 miles of wooden fluming have been erected to convey the sewage over the land. For grazing purposes prairie grass, rye grass, and *Panicum crusgalli* (barnyard grass) have done best. For cutting, lucerne, maize, sorghum, etc., are grown largely, and the crops obtained are exceptionally heavy. The chief sources of revenue



Ernest Gall, Photo.] MARKET GARDENS IN THE ADELAIDE HILLS.

are the leasing of irrigated land, depasturing of stock for private owners, and the fattening of stock for the city market. For cows, 2s. 6d. per head per week is charged; and for horses, 3s. to 4s.; the total grazing receipts amounting last year to £1,645. The Sewage Farm was started in 1881, and has proved a great success, not only from the point of view of the effective disposal of the city sewage on approved methods, but from a financial point of view as an irrigated farm. After payment of a rent of 12s. per acre, 5 per cent. interest on the capital outlay, and the maintaining all buildings, flumes, fences, implements, &c., in good order, the annual profit for the past 10 years has averaged £281.

DRYING APRICOTS IN THE SUN.



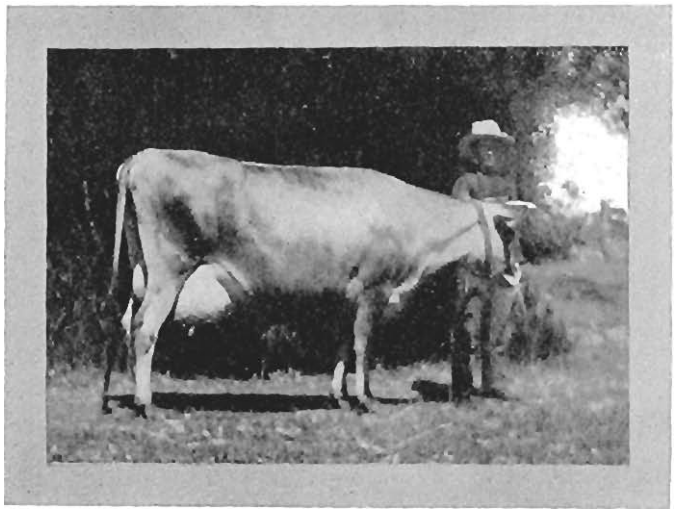
R. H. Ball, Photo.]

A large proportion of our dried fruits are cured by sun-drying. The orchardist must watch his fruit to prevent injury by rain during the drying process. The covering shown on the right of the picture is mounted on wheels, and when rain threatens can be quickly moved over the fruit to protect it.

DAIRYING.

A large area of South Australia is eminently adapted to successful dairying, and while the summer is dry, rendering it necessary to make provision for succulent feed for several months, the temperate nature of the climate enables the dairyman to keep his cows in the open right through the year, the natural shelter in timber country being sufficient, except on a limited number of days of extreme wet and cold. Stall feeding for weeks at a time is unknown; the necessary shelter-sheds can be cheaply provided, while the labor of feeding is, under these conditions, reduced to a minimum. In the northern districts conditions are not so favorable as in the south, but even here dairying can be profitably carried on; the fact that land is much cheaper compensates for the shorter period during which the natural herbage supplies practically all the feed required. In some of the driest of our farming areas dairying has largely replaced wheat-growing, and, although the yield per cow is naturally not so high as under more favorable conditions, still low rents and large areas of natural pasture enable the farmer to make a fair profit.

JERSEY COW, "DINAH IV."

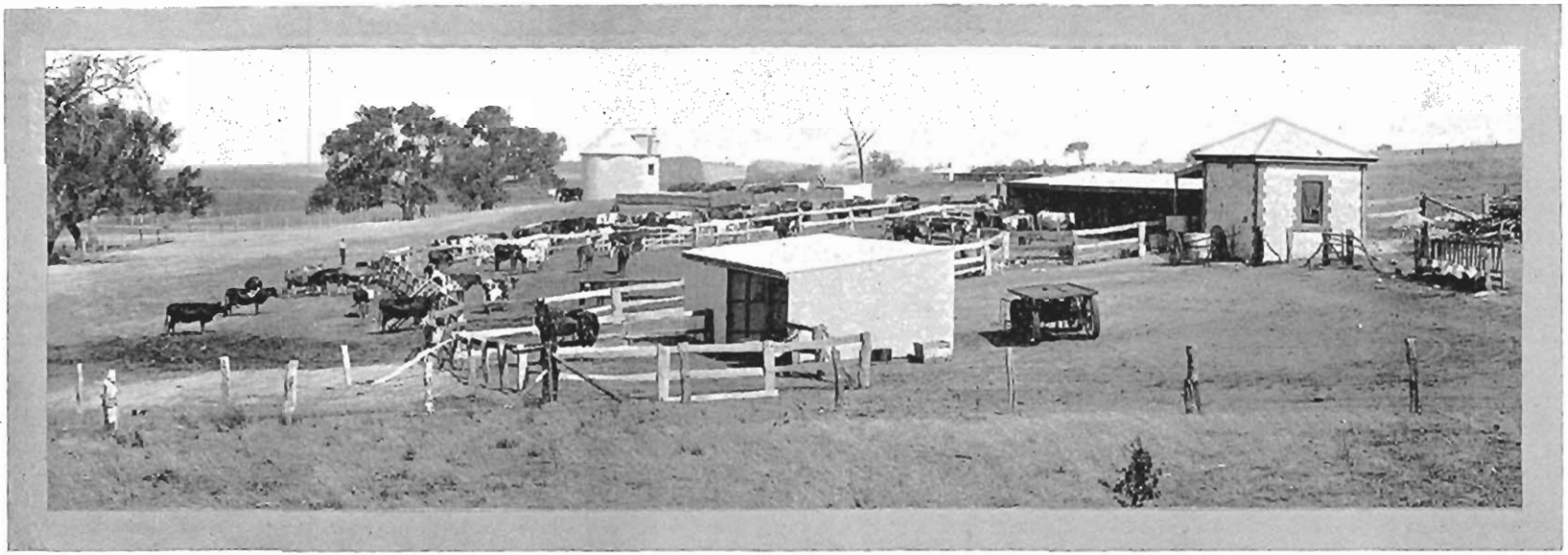


Twice Champion Adelaide Royal Show.

The dairy industry, though of considerable magnitude, has not made as much progress as was anticipated. This is probably due to the fact that wheat-growing and sheep-breeding combined offer greater attractions to the farmer. These industries require a great deal less labor than dairying, besides which the work is not so continuous. So long as highly profitable returns can be obtained from the production of cereals and the breeding of lambs, the dairying industry is hardly likely to make the progress that would otherwise be possible, though there has of late years been steady and continued development in the industry, especially in the Northern districts. In the South and South-East, where conditions are more suitable, there has, on the other hand, been very little extension.

Large quantities of butter are exported to Broken Hill and West Australia throughout the year, while during the spring months shipments are made to Great Britain. During the past four years there has been a marked increase in oversea exports of butter, as the following figures will show:—1903-4, 229 tons; 1904-5, 352 tons; 1905-6, 590 tons; 1906-7, 878 tons.

Official figures show that during the last four years the number of milch cattle has increased 17 per cent. The quantity of butter produced in 1906 (excluding butter made for home use in private families) reached 8,873,630lbs., compared with 8,226,805lbs. the previous



Govt. Photo.] A DAIRY FARM ON THE RIVER MURRAY.

year. Cheese is not made on such an extensive scale proportionately to butter; indeed, in some seasons sufficient for local consumption is not produced. The following figures show the amounts of butter and cheese produced during the past four years:—

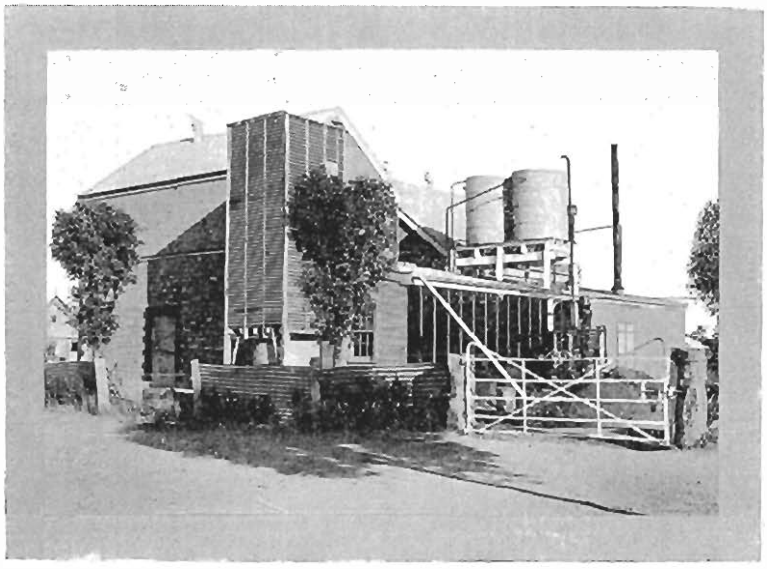
Season.	Butter—lbs.	Cheese—lbs.
1903-4	5,995,756 ..	972,584
1904-5	6,836,169 ..	851,800
1905-6	8,226,805 ..	1,174,867
1906-7	8,873,630 ..	1,398,785

Practically all the cheese is manufactured on the Cheddar system, and an article of very high quality is produced in the best factories.

Special facilities are afforded by the railways for the conveyance of perishable goods, and cream is forwarded by the dairyman to the city factories from districts 300 miles distant. Payment is usually made on the butter-fat percentages; and in order to afford suppliers an opportunity of checking the returns received from private factories the Government established a butter factory in connection with the export freezing works at Port Adelaide. At this factory every can of cream is sampled, and the quantity of butter it will produce is ascertained by the usual methods and the supplier paid accordingly.

A considerable number of butter factories have been erected in South Australia, and the butter produced is generally of high quality. The butter made from the milk of cows grazing on the natural herbage of the country is of splendid quality and color. Hand separators are in general use, the cream being sent to the factories for treatment. The percentage of butter-fat in the milk of cows grazing on the natural pastures is unusually high.

A COUNTRY DAIRY FACTORY.



Kappler, Photo.]

POULTRY.

Owing to the mild nature of the winter and the plentiful supplies of grain, South Australia is eminently adapted to the breeding of poultry, more especially for egg production. True, the heat of the summer months renders it necessary to provide shelter for the stock from the sun's rays, but these entail very little expense; indeed, on most farms the natural brush provides all the shelter required. In the winter months the fowls run in the open without injury, and no elaborate houses are required to protect them against cold, as is the case in many countries.

PORTION OF A POULTRY FARM IN TIMBERED COUNTRY.

W. S. Smith, Photo.]

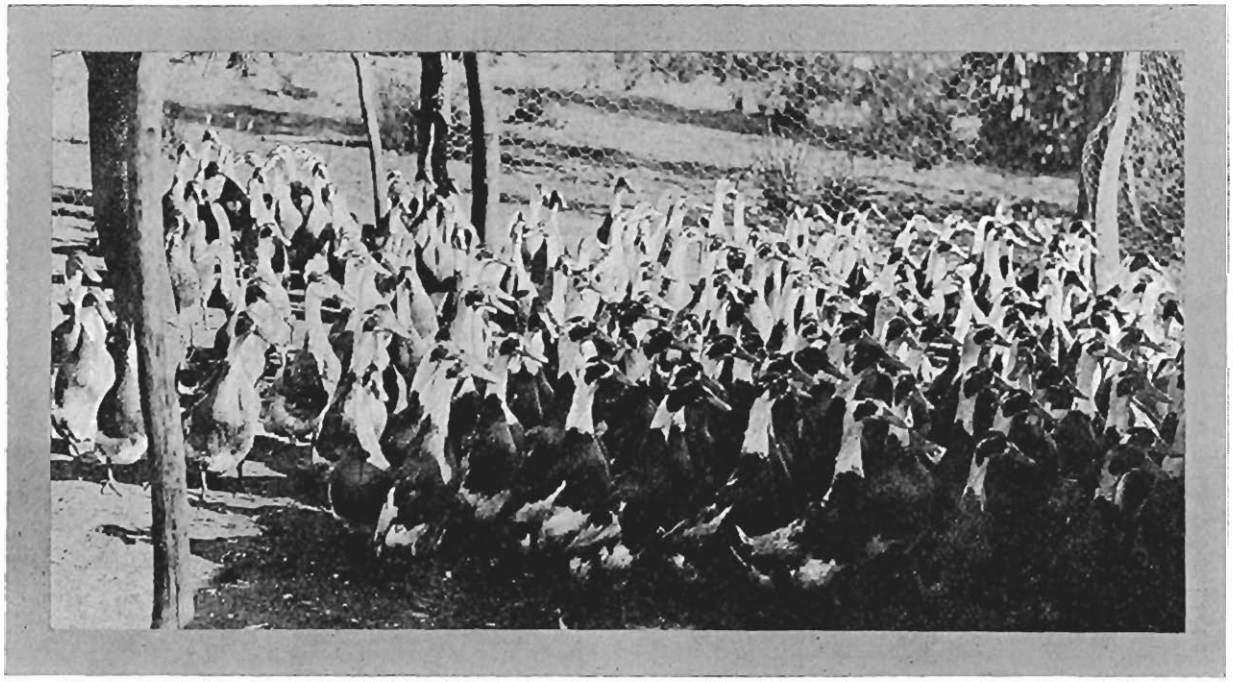
The poultry industry in this State is already of considerable importance. Besides supplying our own requirements we export to the neighboring States eggs and poultry to the value in excess of £100,000 annually. Practically we have no oversea export trade, but the experimental shipments of both eggs and poultry during the past two years suggest that there is a profitable trade to be developed with England, more especially with the infertile eggs. The usual range of wholesale prices for fresh eggs in Adelaide during the flush of the year—September to December—is from 6d. to 7d. per dozen, and as it is during this period that eggs realise the best prices in London, it will be seen that there is every prospect of a large trade being built up, the total cost of shipping and selling the eggs, even on small shipments, being only 3½d. per

dozen, while the returns from infertile eggs have been 1s. per dozen, leaving a net return of 8½d. per dozen, at which price there is a good profit to the producer.

Generally speaking, the breeds most in favor are the Leghorns, Wyandottes, and Orpingtons; the firstnamed being, as a general thing, most profitable layers, while for egg production and table purposes combined, the other two breeds are favored.

The annual value of our poultry industry already exceeds half a million sterling. Given the expected development of the export trade, this amount will be greatly increased in the course of a few years. The breeding of poultry as a special industry is not advocated, except under special conditions, poultry being most profitable in conjunction with cereal-growing, dairying, and fruit-growing, as in each case large quantities of otherwise waste material can be utilised, thus reducing the feed bill to small dimensions.

A GOOD FLOCK OF DUCKS.



W. S. Smith, Photo.]

Of late years considerable attention has been given throughout Australia to a series of annual egg-laying competitions, and these have demonstrated the possibilities of the business, where reasonable care and attention is given. In these competitions the South Australian breeders have more than held their own.

Three egg-laying competitions have been held in this State, and the returns show that even average layers will, with regular feeding, give a fair profit over cost of food; while where attention is paid to the improvement of the laying strain, the returns are largely increased.

From the experience of our poultry-farmers in various parts of the State, it is reasonable to assume that, with proper attention, the farmer or dairyman should realise a profit of at least 5s. per hen per annum

MINOR INDUSTRIES.

The olive tree thrives in South Australia, and a considerable amount of capital has been invested in the industry. The olive is grown mainly for oil production, practically nothing being done in the pickling of the fruit. The annual output of oil varies according to the season from 15,000galls. to 18,000galls., and this meets with an active demand throughout Australia. The number of olive trees included in the agricultural returns is given as 83,153, but a large proportion of these are grown as shelter trees, breakwinds, hedges, &c., but little use being made of the fruit.

The growing of wattles (acacia) for the bark for tanning is carried on mainly in the southern part of the State. Over a large area the wattle grows naturally, and regular crops of bark are obtained without any outlay in respect to sowing and cultivation. Considerable areas of comparatively poor land have been cleared of the natural growths and sown to wattles with satisfactory results. The trees are fit to strip at five to seven years old, according to soil, &c. The annual production of wattle bark is from 7,000 tons to 10,000 tons, most of which is exported.

Pig-breeding is carried on in conjunction with farming operations in most districts, while there are also several large establishments specially devoted to the breeding of pigs for bacon curing. A good number of bacon-curing factories are in operation, and in addition to supplying the local demand, a considerable export trade is carried on with the neighboring States.

Bee-keeping is another industry which is followed with profit in the timbered districts, mostly in conjunction with other branches of industry, though a number of settlers rely upon their bees. As the bee-keeper depends almost entirely on the flowers of the native trees and bushes for his honey, the output varies according to the season. The official statistics show the number of hives at from 24,000 to 25,000, and the honey yield from one million to one and a quarter million pounds weight. This would not cover the total production, as many persons who have only a few hives furnish no returns. Up to the present, local and inter-State markets have been depended upon to absorb the annual output, but the efforts of the South Australian Commercial Agent to open up an export trade with Great Britain promise well, the prices realised for shipments made during the past year being satisfactory to the producers.

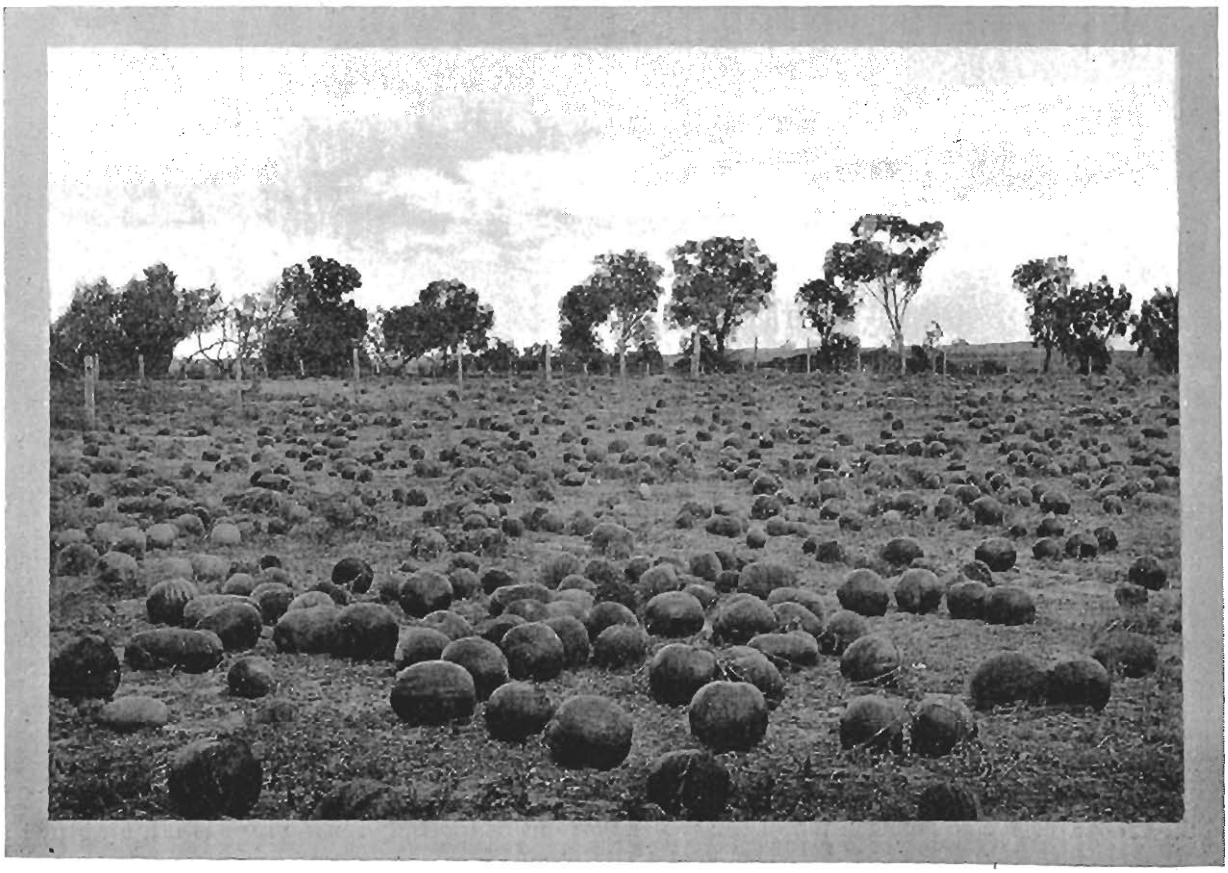
Potatoes are cultivated to a considerable extent, the area under this crop exceeding 10,000 acres. The tuber is grown almost entirely for domestic use, though formerly in the Mount Gambier district considerable quantities were utilised for the manufacture of spirit. The Federal legislation in respect to the use of this spirit resulted in the extinction of the industry. Consideration has been given to the utilisation of the unmarketable potatoes for the manufacture of starch and alcohol for power purposes ; and in view of the large areas in the South-East suited to the production of this crop, there should be room in the future for development in these directions. Onions for domestic use constitute another profitable crop. Turnips, mangolds, and other roots receive some attention in the cooler portions of the State, while rape is largely grown as a fodder crop.

Field peas are largely grown in the hills districts near Adelaide, in the South, and South-East. Generally speaking, in the Northern districts, with relatively few exceptions, the spring is too dry for this crop. In the past the growing of field peas has been mainly carried on in conjunction with the breeding of pigs, the bacon made from pigs topped up on peas being much

sought after. Usually in these districts peas precede wheat or other cereals for hay, the beneficial effect of the leguminous crop on the succeeding cereals being marked. During late years some farmers have topped up sheep and lambs on the pea crop with most satisfactory results. As under this system the labor and cost of gathering and threshing the peas is avoided, while the financial returns are good, there is little doubt that the practice will rapidly develop. Both sheep and lambs fatten very quickly on peas.

The dry conditions prevailing throughout the summer months over such a large area of the State necessarily limits the cultivation of lucerne, forage grasses, and similar crops. In those districts where the conditions are more favorable considerable attention is given to both lucerne and sown grasses, the total area under lucerne being 15,000 acres and under grasses 23,000 acres.

A GOOD CROP OF PIEMELONS—GROWN WITHOUT IRRIGATION.



Govt. Photo]

MAIN BUILDING ERECTED IN 1883

A PORTION OF THE DAIRY HERD

HAYSTACKS IN THE BUILDING

ROSEWORTHY AGRICULTORAL COLLEGE SOUTH AUSTRALIA

R. K. Lawrence, Photo.]

GOVERNMENT AID TO AGRICULTURE.

The Government of South Australia does all in its power to assist the producer—not only to secure the best returns from his land, but also in opening up new markets.

The Department of Agriculture and Intelligence is available to present and prospective settlers desiring advice and instruction on matters connected with the cultivation of the land, the growing of various crops, the preparation of produce for market, the marketing of produce, the feeding and treatment of stock, &c. Experts on agriculture, viticulture, horticulture, dairy, poultry, wool, &c., are attached to the Department, and may be consulted free of charge. A monthly *Journal of Agriculture* is issued at a nominal fee, while from time to time bulletins on special subjects are published.

Several experimental farms have been established, besides which numerous experimental plots have been laid down in various parts of the State for the guidance and help of the landholders. Attached to the Agricultural College is a farm of about 1,500 acres, cereal-growing, stock-rearing, dairying, wine-making, and other pursuits being carried on. At Kybybolite, in the south-east portion of the State, 2.256½ acres have been set apart as an experimental farm. At Parafield 80 acres are devoted to the testing of varieties of wheat and to the improvement of wheat by cross-breeding and by selection. In the dry areas, where the rainfall averages about 10in. per annum, two experimental blocks have been established. At Murray Bridge a small area of reclaimed swamp land is cultivated by the Agricultural Department in order to afford information to holders of similar land as to best crops to grow, methods of cultivation, &c.

The Roseworthy Agricultural College, situated in the centre of the farming areas, about 25 miles from Adelaide, was established in 1885 for the purpose of teaching young men the principles and practices of scientific agriculture. Attached to the college are chemical laboratories and lecture rooms, while on different parts of the farm are situated a well equipped wine-making plant and cellars, a butter and cheese factory, incubator house, &c., besides the usual farm buildings. There is accommodation for 60 students, and each student is given full opportunity of making himself thoroughly acquainted with every detail of farm work and the machinery used in connection therewith. While a few competent and experienced men are employed to help and instruct them, the bulk of the work on the farm is done by the students. Each year from 250 to 500 acres are cropped with cereals and green crops, while the stock comprise about 80 head of dairy cattle, from 1,000 to 1,600 sheep, over 300 pigs, and a large number of poultry. The technical subjects taught at the college are general agriculture and livestock, viticulture and œnology, fruit culture, dairying, elementary veterinary science, book-keeping, surveying, wool-classing, and poultry-breeding. The fee is £30 per annum, and the course comprises nine sessions extending over three years.

In order to assist in the development of the export trade in perishable products, the Government Export Department was established, and freezing works and cold storage accommodation provided at Port Adelaide. Butter, fruit, wine, lambs, rabbits, poultry, eggs, honey, and other products are treated and shipped on behalf of the exporters. Charges sufficient to cover cost and return fair interest on the capital invested are made. Where desired, the department undertakes the disposal of the produce in Great Britain on behalf of the exporter.

AGRICULTURAL MOTOR PULLING A FOUR-FURROW PLOUGH.

One of these motors has been purchased for the Roseworthy College Farm to demonstrate its value under South Australian conditions.

Ernest Gall, Photo.] PORTION OF WHEAT SECTION, ADELAIDE ROYAL SHOW 1907.

HEAD OF MERINO RAM.

C. P Scott, Photo.